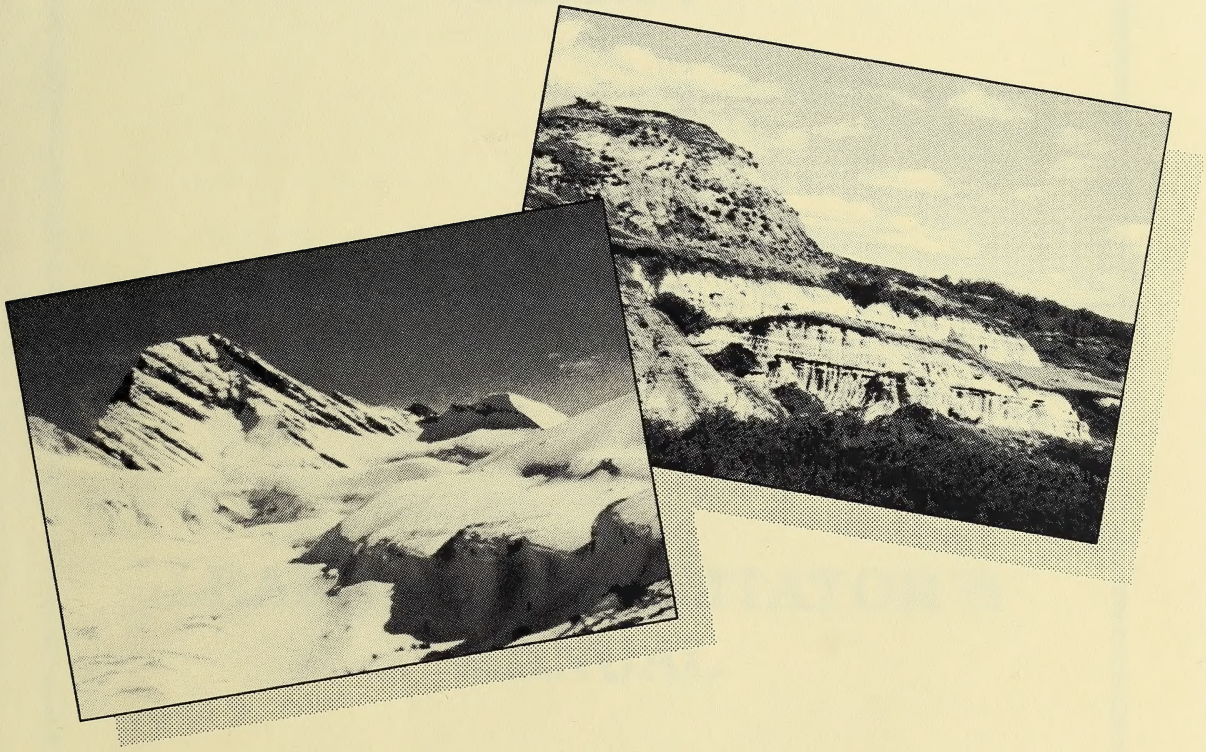
SCIENCE 7

LEARNING FACILITATOR'S MANUAL



MODULE 6:
EVIDENCE OF EROSION

Distance Learning

Alberta EDUCATION

Science 7

Module 6

LEARNING FACILITATOR'S MANUAL

Alberta
EDUCATION

ACKNOWLEDGEMENTS

This module has been based on **Science Directions 7** by John Wiley & Sons/Arnold Publishing Ltd., 1989. Program consultant was Douglas A. Roberts. The author team for the complete text included Wilson C. Durward, Eric S. Grace, Gene Krupa, Mary Krupa, Alan J. Hirsch, David A.E. Spalding, Bradley J. Baker, and Sandy M. Wohl. Contributing author was Jean Bullard. Portions of **Science Directions 7** have been used throughout and have been adapted in a variety of ways.

Cover photographs courtesy of Dave Mussell, Edmonton.

Note

This Science Learning Facilitator's Manual contains answers to teacher-assessed assignments and the final test; therefore, it should be kept secure by the teacher. Students should not have access to these assignments or the final tests until they are assigned in a supervised situation. The answers should be stored securely by the teacher at all times.

Science 7
Learning Facilitator's Manual
Module 6
Evidence of Erosion
Alberta Distance Learning Centre
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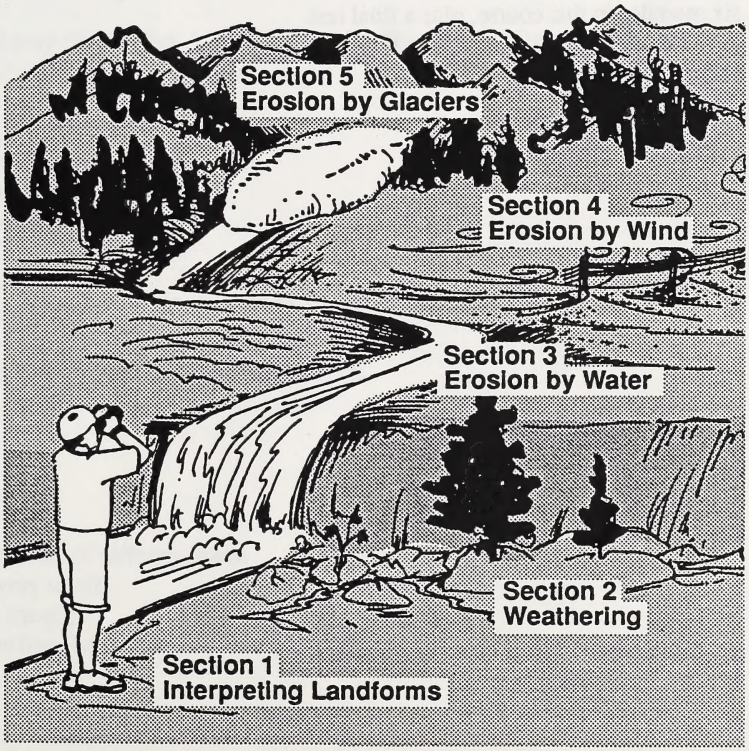
Module 6 – Evidence of Erosion: Overview

The major emphasis of this module is on the nature of science. However, opportunities are also present to support the science and technology emphasis as well as the science, technology, and society aspects of the Science 7 program.

In this module students learn about how scientists study and explain changes to the Earth's surface brought about by the erosion, transport, and deposition of earth materials. Students develop an awareness and appreciation of how the Earth's surface gradually changes over long periods of time. They also learn how humans depend on the physical aspects of Earth, yet at the same time can affect the speed at which changes to the physical Earth occur.

In Module 6 students will experiment with models, such as stream tables, to test different variables to learn more about how changes can occur to the Earth's surface. By doing so they become more familiar with such scientific processes as observing and predicting, and learn how to make inferences about how the landscape has changed on the basis of evidence from data gathered.



Evaluation

The student's successful completion of all assignments will depend on practice obtained while doing the various activities. Many choices of activities have been provided so that students have some control over their own learning.

The following distribution of marks is suggested in determining the student's grading for this module.

Section 1 Assignment	**0%**
Section 2 Assignment	**34%**
Section 3 Assignment	**21%**
Section 4 Assignment	**20%**
Section 5 Assignment	**25%**
TOTAL	**100%**

Note: There is no assignment to be completed for Section 1.

Although the value of each module for the Science 7 course is the decision of the classroom teacher, it is suggested that Module 6 be worth 12% of the total final grade, based on equal weighting of the six modules in this course, plus a final test.

Materials Needed for Module 6

Comment:

For a complete overview of the materials needed for Module 6 and how the topics are developed, it may be helpful to preview the contents of Module 6. In some cases if the materials suggested are not readily available, the learning facilitator may be able to substitute suitable materials for the student so that the activities can be completed successfully.

The materials needed for Module 6 and the activities in which they are to be used are as follows:

Section 2: Activity 1

- plastic bottle with screw top
- plastic bag
- water
- freezer

Section 2: Activity 2

Note: Students may choose Part A, or Part B which does not require any materials.

Part A

- two uncoated iron nails
- glass of water
- two pieces of chalk
- bottle of soda pop

Section 3: Activity 1

Note: Students may choose either Part A or Part B.

Part A

- stream table
- water
- rock fragments of different sizes:
  - sand (very small)
  - gravel (small)
  - pebbles (medium)

Part B

- large transparent jar with lid
- water
- rock fragments of different sizes:
  - sand (very small)
  - fine gravel (small pieces of gravel)
  - pebbles (medium pieces of gravel)

Section 3: Activity 2

- transparent jar with lid
- water
- mixture of rock fragments:
  - sand
  - silt
  - small gravel

Section 3: Activity 4

- small jar or can
- water
- graduated cylinder or measuring cup
- soil samples:
  - dry gravel
  - dry sand
  - dry potting soil
  - dry garden soil
  - dry clay

Section 3: Activity 5

- shallow container that will hold water (minimum $30 \times 20 \times 5$ cm)
- open-ended plastic or metal tubing, about 1 cm in diameter
- sand
- water
- beaker or other convenient small container

Section 3: Enrichment

- stream table or large plastic pail to catch the water and rock particles
- gold pan (or metal pie plate)
- gravel of mixed sizes
- sand
- lead shot, or another heavy substitute for gold
- water

Section 4: Activity 1

- drinking straws
- dry sand
- newspaper

Section 4: Activity 2

- hand-held hair dryer or small fan
- soil samples
- long, shallow box or tray (can be made by cutting down a large cardboard box to about 5 to 10 cm)
- plastic cup
- weights to hold cup in place

Section 5: Activity 3

- sand
- gravel
- several ice cubes
- several ice cubes made from water mixed with gravel
- several ice cubes made from water mixed with coarse sand
- plastic bucket
- piece of cardboard

Section 5: Extra Help

- modelling clay

Section 1: Interpreting Landforms

By the end of this section students should be able to

- recognize evidence of changes in the Earth's surface
- describe some features that result from changes in the Earth's surface
- understand some of the effects of these changes if they occur over a very long period of time
- understand that scientific knowledge builds up and changes over time.

Section 1: Activity 1

Comments:

For this activity students need to examine three photographs in their textbook. For each photograph they should

- describe their observations
- infer the changes they think have occurred
- explain what they think caused the change

1. Examine the photograph on the bottom left corner on page 297 of *Science Directions 7*. It shows a lady standing beside a hoodoo.

   a. Observations (Describe the appearance of a hoodoo.)

      Answers will vary. Hoodoos such as this one are tall shapes made of rock that stand separately from the rocks around them. Hoodoos usually have a cap rock on top. The rock is in layers.

   b. Inferences and Explanations (How do you think this formation was formed?)

      Answers will vary. Students may suggest wind or water erosion as being factors in the formation of hoodoos; water erosion is generally the main factor.

2. Examine the photograph on the top right corner of page 297 of *Science Directions 7*. It shows a waterfall.

   a. Observations (Describe what you observe about where the water flows and what is around it.)

      The water flows over the falls and between the rocks on either side.

   b. Inferences and Explanations

      Answers will vary. The water is pulled down by the force of gravity. The waterfall wears away rocks on the bottom and sides of the falls.

3. Examine Photograph B on page 299 of *Science Directions 7*. It shows an avalanche.

   a. Observations (What is happening in this picture?)

      Snow is sliding down the mountainside.

   b. Inference and Explanations (What do you think makes this happen?)

      Answers will vary. The weight of the thick layers of snow causes the snow to break free and slide down the mountain. Sometimes there is a trigger event that sets off the slide, such as a loud noise or the movement of a rock or an animal. Avalanches usually occur after there has been repeated partial melting and refreezing of the snow.

Section 1: Activity 2

1. Joanne wanted to explain what she saw and tell why it happened. What did she see that she wanted to explain?

   She wanted to explain the changes she saw in the park by the school.

2. How did she explain what she saw? Write two inferences (explanations) that Joanne made.

   - inference one – Joanne thought that *the paths were made by students.*
   - inference two – Joanne thought that *the rain deepened the paths.*

3. What did Joanne observe that supports these inferences?

   - inference one – *She observed that the grass was worn where people walked most often.*
   - inference two – *She observed the water running down the paths and the paths getting deeper.*

4. What might happen if the paths are used for many years without being paved?

   The paths might become deeper.

5. List two examples of other small and slow changes that can change the shape of the land. If you can, think of examples from around where you live.

   Answers for questions 5 and 6 will vary. The following are possible answers.

   - *the wearing away of a river valley*
   - *small gullies in a field getting larger after repeated rainfalls*
   - *the wearing down of a mountaintop*
   - *topsoil blowing in the wind*

6. Name or describe two examples of sudden changes that affect the shape of the land.

   - *an avalanche*
   - *an earthquake*
   - *a landslide*

Section 1: Follow-up Activities

Extra Help

> Note: Students may do either Part A or Part B, or they may do both Part A and Part B.

Part A

1. Read the descriptions of the following changes. Decide if the change is sudden or slow. Then give an explanation for your answer. The first one has been done for you as an example.

   a. In 1906 an earthquake destroyed San Francisco, California. The shock was so violent that many people who were standing were thrown to the ground, and many people who were sleeping were thrown from their beds. The tremor was felt from Coos Bay, Oregon, to Los Angeles, California, a distance of about 1 100 km.

   Type of Change (sudden or slow): *sudden*

   Explanation:

   The movements described are powerful ones that occur over a short period of time. Earthquakes are usually over in a matter of minutes.

   b. In the year 79 AD, Mount Vesuvius, in Italy, erupted and covered Pompeii with more than 7 m of ash and lava. More than 2 000 people perished. People had been living near Mount Vesuvius for over 800 years. There is no record of a previous eruption.

   Type of Change (sudden or slow): *sudden*

   Explanation:

   The eruption occurred so quickly there was no time for the people to escape.

c. Records of Niagara Falls, kept since it was first described in 1678, show that the crest of the Canadian part of the falls has receded about 50 m every 100 years.

Type of Change (sudden or slow): *slow*

Explanation:

A change of that distance would be so slow that you would not notice the change if you watched for only a few hours or days.

d. The volcano Surtsey began to erupt in the ocean off the southwest coast of Iceland on November 14, 1963. Two years later, Surtsey was an island over 2 km^2 in area and 150 m high, with plants growing on it.

Type of Change (sudden or slow): *sudden*

Explanation:

The island must have appeared very quickly if after two years there were already plants growing on it.

e. The North Saskatchewan River winds through Edmonton, Alberta, in a deep wide valley. Bridges built years ago are still serviceable since the river's course has not changed greatly since the bridges were built.

Type of Change (sudden or slow): *slow*

Explanation:

The river continues to follow much the same course from year to year. The riverbanks have not changed substantially since the bridges were built.

f. The island of Hawaii consists of five great volcanoes grown together. They rise from the ocean floor to a height of more than 4 000 m above sea level. Two of the volcanoes, Mauna Loa and Mount Kilauea, still erupt occasionally.

Type of Change (sudden or slow): *sudden or slow*

Explanation:

Answers will vary. The changes could be interpreted either as fast or slow.

- *Sudden: Eruptions cause large quantities of materials to flow.*
- *Slow: The eruptions occur over a long period of time, each one building up the land mass a little more.*

Part B

2. Observe change in your neighbourhood. Look for three areas near your home that you can visit easily. You may select part of a garden, a grassy area on a slope, an area of earth beside a wall, a river bank, or any other areas where you think changes might occur.

   Watch for evidence of slow change and evidence of sudden change. Record your observations carefully at each location. Then classify the type of change as one of the following: no change, slow change, or sudden change.

   Give reasons for your classification.

   a. Neighbourhood Area One

Observations:
Answers will vary. The interpretation of each example should be similar to those given in previous examples. Two sample answers follow.
Type of Change _____
Explanation:

b. Neighbourhood Area Two

Observations:

Sample Answer: A set of steps in an old building has hollows in the middle of each step where people place their feet.

Type of Change *slow*

Explanation:

The steps have been worn down slowly over a number of years.

c. Neighbourhood Area Three

Observations:

Sample Answer: A bank by a river valley has caved in.

Type of Change *sudden*

Explanation:

The side of the river bank gave away and slid down in just a few seconds.
OR
One day the bank was normal and the next it had caved in.

Enrichment

1. Read the following descriptions. Each description is followed by two possible inferences that explain the observations. Choose the better inference. Then briefly describe why you think it is better. Describe one additional observation you would like to make to support, modify, or reject the inference you chose.

   a. A 75-year-old building has steps made out of slate, which is a type of rock. The steps are worn down in the centre but show very little wear on their outer sides.

      Inference A: The material near the centre of the steps is softer than the material near the outside. This is why the steps wear down faster near the centre.

      Inference B: More people walk on the centre of the steps than on the outside. This is why the steps wear down faster near the centre.

      The more likely inference is *B*.

      Explanation:

      You can observe that people usually walk on the middle of the step.

      Additional observations or tests you would like to make to check your inference:

      Check the hardness of the steps near the middle and near the edges.

   b. The large valley located between Banff and Lake Louise has a fairly small river running in it.

      Inference A: The river was once much larger. This is why the valley is so big compared to the river.

      Inference B: The glacier at Lake Louise was once much larger and filled the wide valley. This is why the valley is so big compared to the river.

      The more likely inference is *B as it is the most correct response. Inference A could also be accepted, provided that the explanation is reasonable.*

      Explanation:

      It is reasonable to expect that B would be correct if the student is aware that most of Alberta was once covered by glaciers and that there are glaciers in the area even to this day.

Additional observations or tests you would like to make to check your inference:

Answers will vary. Sample answers:

- *One could look to see if there are any signs that glaciers have cut the valley (e.g. glacial grooves).*
- *One could look at the shape of valleys cut by glaciers and rivers and see which one this valley is most similar to.*

c. A paved bicycle path has several dandelions growing through it. There are lots of dandelions growing near the edge of the path. The path is three years old.

Inference A: When the path was paved, there were spots missed. The dandelions grew in these missed spots.

Inference B: The dandelions grew through the path by forcing up and cracking the path. This is why a few are now growing through the path.

The more likely inference is *either A or B. Both of these inferences are reasonable, though A is the more likely of the two.*

Explanation:

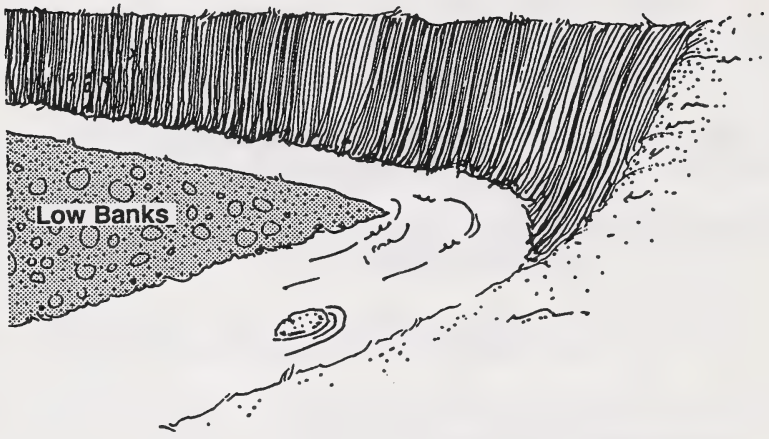
Inferences A and B both provide an explanation for why the dandelions are found in only a few places.

Additional observations or tests you would like to make to check your inference:

To have a better idea of what is happening, it would help to observe a path such as this one over a number of years to see if more dandelions appear by forcing their way through. It would also be helpful to see if a dandelion can grow through asphalt where at the start there is no opening.

d. The bank on the inside of a bend in a river is about 5 m above the river, then drops to an area that is fairly low and flat. On the outside of the bend, the bank is quite steep and is 5 m above the river. Where the river runs straight, the banks on both sides are about the same distance from the river.

Steep Banks



Inference A: The river flows faster on the outside of a bend than on the inside of a bend. The faster running water on the outside of the bend cuts away at the bank more than on the inside of the bend.

Inference B: The bank on the inside of the bend is softer than the bank on the outside of the bend. The bank on the inside of the bend is more easily carried downstream by the river.

The more likely inference is *A*.

Explanation:

Answers will vary. Sample answer: When water reaches a bend in the river, it is guided around by the outside bank resulting in the formation of a steep bank. The inside bank is a gradual slope with a relatively low flat area just above the stream.

Additional observations you would like to make to check your inference:

Check the softness of the materials in the two banks of the river to see if the material is harder on one side than the other.

Comment:

There is no assignment for Section 1. Students are to proceed to Section 2 at this point.

Section 2: Weathering

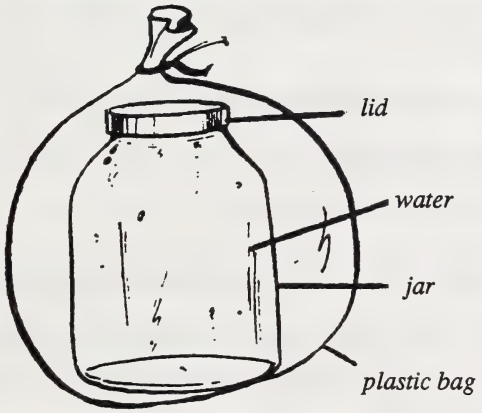
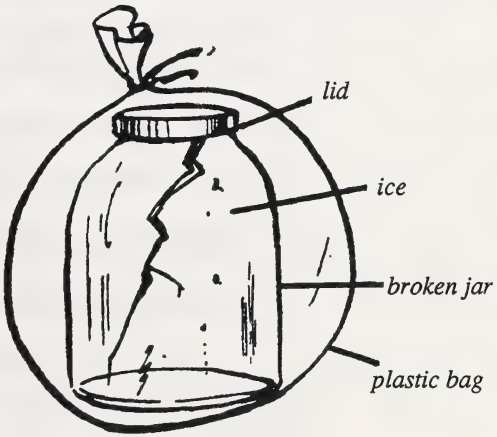
By the end of this section students should be able to

- explain what is meant by the term weathering
- recognize examples of weathering
- describe mechanical, biological, and chemical weathering
- identify variables that affect how fast something weathers

Section 2: Activity 1

Observations

In the following chart include drawings and descriptions of what you observed.

Before Freezing	After Freezing
	

Comments:

This demonstration of what water does when it freezes should help students understand what could happen to rock. The plastic container represents rocks with cracks in them. Conditions in a freezer represent a cold night when water freezes.

Questions to Answer

1. How could this kind of change cause rocks to split apart? What would have to happen?

   If there were cracks in a rock, water could get into the cracks. If the water were to freeze, the water would push the pieces of rock apart.

2. The container you used is much larger than many cracks in rocks. Explain why it would take a long time for water freezing and thawing in cracks to break rocks apart.

   Only a small amount of water will fit in a crack between two rocks, so the splitting only takes place a little bit at a time.

3. Why should you never store liquids in a glass bottle in a freezer?

   As the water freezes, it will expand and the container may break.

4. Use what you have learned so far in this activity about the mechanical weathering of rocks to help you answer the following questions.

   a. What is the first sign that mechanical weathering is taking place in rocks?

      Cracks begin to form in the rock.

   b. What causes this to happen?

      This is caused by repeated heating and cooling of the rock, which causes expansion and contraction over and over again.

   c. What further change takes place as mechanical weathering carries on?

      Water gets into the cracks and the cracks open wider.

   d. What causes this to happen?

      This is caused by water freezing in the cracks during cold nights or during winters.

5. Refer to question 4 when answering this question. Why do you think scientists need to include the first part of the explanation for weathering? (Can you explain this type of weathering by using only the second part of the explanation?)

   The first part of the explanation is needed to tell how the cracks get started.

6. Examine the top left photograph on page 302 of *Science Directions 7*. In Section 1, this photograph was used as an example of slow change. The photograph shows **strata** of rocks near Banff, Alberta.

   a. What evidence of weathering do you see in the rock strata?

      Answers will vary. Cracks can be seen in the rock. Also, one can see different lichens that are growing on the rock.

b. What additional evidence would you look for if you were able to visit the location?

Answers will vary.
Sample answer: Check to see if the cracks go all the way through the rock.

Section 2: Activity 2

Note: Students are to do either Part A or Part B.

Part A

Interpretations

1. Describe the colour changes that occur on the nail.

   The nail becomes covered with a dull reddish-brown layer.

2. Is the rust harder or softer than the iron nail?

   It feels softer. (It can be scraped off easily.)

3. What evidence is there that rust is a different material from iron?

   Answers will vary. The colour is different and the hardness is different.

4. Which is more easily broken into smaller pieces, the iron or the rust?

   The rust is more easily broken into smaller pieces.

5. a. Describe your observations.

   The chalk gradually comes apart and forms a little pile in the bottom of the bottle.

   b. Is this an example of mechanical or chemical weathering?

   It is an example of chemical weathering.

   c. Give a reason for your answer.

   There is a chemical that causes the change (soda pop). **or** *The original material is changed into another material.*

Part B

Chemical weathering involves changes that result in new materials. Read the following situations. Then make some interpretations. Answer questions 6 to 9.

Situation 1

You decide to build a doghouse for your new puppy. You take some wood and some iron nails outside. Just after you begin, it starts to rain, so you leave the supplies in the yard and run into the house.

The next day when you return, you notice that the nails are covered with orange spots. When you pick up a nail, the orange colour rubs off onto your hand. You realize that the nails have started to rust.

Interpretations

6. a. Is rust softer or harder than the iron nail?

   Rust is softer.

   b. How do you know?

   It rubs off on your fingers.

7. What evidence is there that rust is a different material from iron?

   The colour is different and the hardness is different.

8. Which is more likely to be broken into smaller pieces, the iron or the rust?

   The rust is more likely to be broken into smaller pieces.

Situation 2

Another day you are writing on a blackboard during lunch. You accidentally drop a piece of chalk into your glass of soda pop. You notice that the chalk starts to fizz. When you empty the pop out of the glass, you notice that the chalk is much smaller and has lots of tiny holes in it.

Interpretations

9. a. Is this an example of mechanical or chemical weathering?

   It is an example of chemical weathering.

   b. Give a reason for your answer.

   The original material is changed into another material.

Section 2: Activity 3

1. Predict what should happen as more and more gases from automobiles and industries are added to the air.

   Materials that are affected by these gases will be affected more strongly and more quickly.

2. Describe how scientists could test the prediction.

   Answers will vary. Scientists could compare the changes that take place in areas where there is very little emission of gases that cause acid rain, with changes that take place where there are large quantities of these gases.

3. Cleopatra's Needle is the name of a monument that was built in Egypt over 3 000 years ago. Egypt's weather is warm and dry. Until 100 years ago, the carvings on the sides of the monument were sharp and clear. In 1880, Cleopatra's Needle was taken to New York City. Its carvings are now badly worn down.

   a. Do the observations about Cleopatra's Needle support the idea of chemical weathering?

      Yes.

   b. Explain why or why not.

      Answers will vary. The observations show that the changes take place much more quickly in areas where there are many automobiles and other sources of air pollution.

4. Kim tried to explain chemical weathering to her grandfather. He smiled, then told her a story about gnomes. He described gnomes as small little old men who live in caves and guard buried treasure. The gnomes dig caves in limestone, leaving stalactites and stalagmites so that it is more difficult for their larger enemies to run through the caves. Gnomes have a magic power to make themselves invisible whenever people approach. Kim's grandfather also explained that what she called chemical weathering on the Earth's surface was really caused by the gnomes when they went out to search for more building materials. Gnomes chipped off small pieces of limestone, marble, and sandstone to build their cities in caves deep underground, much deeper than people have ever been.

   Kim told her grandfather that although she enjoyed the story about the gnomes, it still wasn't a scientific explanation. "Why not?" he asked her.

   Explain why the "gnome idea" is not a scientific explanation.

   Answers will vary. The explanation is not a scientific one because it cannot be tested. Science deals with what we can see and observe for ourselves and it must be testable.

Section 2: Activity 4

Note: Students are to do either Part A or Part B.

Part A

Plan a hike that will take you to a variety of locations. These locations might include an open field, an area with lots of trees, a stream or river bank, as well as locations near buildings. Look for examples of biological weathering. Keep notes so that you can describe three examples and explain what evidence there is that biological weathering has occurred.

1. a. Describe your first example of biological weathering.

   Answers will vary. Sample answer: A rock is found with some cracks in it.

   b. What evidence indicates that biological weathering has occurred?

   There are roots in the cracks.

2. a. Describe your second example.

   Sample answer: A rock is found with some lichen growing on it.

   b. What evidence indicates that biological weathering has occurred?

   The rock is very dull-looking on the outside.

3. a. Describe your third example.

   Sample answer: Some rocks were found at the front of a ground squirrel hole.

   b. What evidence indicates that biological weathering has occurred?

   Answers will vary. The rocks have been brought up by the squirrel. They do not appear to have gotten there by themselves.

Part B

4. Describe one example of mechanical weathering.

   Answers will vary. Sample answer: splitting apart of rocks by heating and cooling

5. Describe one example of chemical weathering.

   One example is the wearing down of rocks by acid rain.

6. Describe one example of biological weathering.

   An example of biological weathering is the splitting apart of rocks by roots.

7. How is biological weathering different from mechanical and chemical weathering?

   Answers will vary. Biological weathering involves the actions of living things.

8. How is biological weathering similar to mechanical and chemical weathering?

   Answers will vary. All cause the breakdown of rock materials.

9. How are rock, soil, and living things connected?

   Answers will vary. Many living things are found in rock and soil. Living things help change rock into soil. The minerals in the rock and soil provide nutrients to plants and animals.

Section 2: Activity 5

Read each of the following descriptions. Then make the necessary interpretations to try to explain how each change might have happened. If you have difficulty with some of the explanations, review the previous activities along with the associated textbook readings for this section to help guide you.

1. You take four pennies out of your pocket and look carefully at their colour. The pennies with dates of 1991 and 1990 are bright and shiny. The ones with dates of 1979 and 1982 are dark and dull. Explain what might have happened to the older pennies.

   Answers will vary. The change is caused by chemical weathering, which results from the exposure of the penny to the air and to the materials on people's hands.

2. You are walking in a newly developed part of a city. The concrete sidewalks are smooth and level. In the older part of the city in which you live, the sidewalks have lots of cracks, and some parts of the walk are raised up several centimetres. Explain what might have happened to the sidewalks in your part of the city.

   The sidewalks may have been affected by repeated heating and cooling and by the repeated freezing and thawing of water in cracks and under the sidewalk.

3. For your summer holidays you travel to Quebec. You notice that many of the cathedrals have metal steeples, of a green colour. The new church in your town in Alberta has a copper-coloured steeple. When you ask, you are told that all the steeples are made from copper. Explain what might have happened to the steeples in Quebec.

   The copper may be changed by combining with materials in the air, including pollutants.

4. When hiking through the woods, you see a large tree growing through a rock. The rock seems to be split into two parts. Explain what might have happened to the rock.

   Answers will vary. The crack may have been originally started by heating and cooling, then enlarged by water and enlarged further by plant roots.

Section 2: Follow-up Activities

Extra Help

Note: Students may do either Part A or Part B, or they may do both Part A and Part B.

Part A

Imagine that you are a rock. Write an imaginary story about how you are changed into several pieces by weathering. Describe what happens to you. Use diagrams if you wish.

Use all of the words in the word list below. Try to use the words in a way that will show that you understand what they mean.

Word List

biological weathering
calcium carbonate
carbon dioxide
chemical weathering
contract
expand
ice wedging
mechanical weathering
temperature

Write your story here. There is more space on the next page if you need it.

Breaking Up Is Hard to Do

Answers will vary. Students should show evidence of creativity as well as an understanding of the items listed.

biological weathering
calcium carbonate
carbon dioxide
chemical weathering
contract
expand
ice wedging
mechanical weathering
temperature

Part B

Fill in the blanks below with the words from the following word list. You will only use ten of the words. Draw a line through each word as you use it.

Word List

animals	limestone
biological	marble
calcium carbonate	mechanical
carbon dioxide	plants
carbonic	rock
chemical	soil
contract	temperature
expand	weathering
ice wedging	

1. The process of rocks being broken down into smaller pieces is called *weathering*.
2. *Biological* weathering involves the action of living things.
3. During *chemical* weathering solids change into different materials.
4. The weak acid that forms when rain mixes with *carbon dioxide* is called *carbonic* acid.
5. When solids are cooled, they *contract*.

6. Cracks can form in rocks during changes in *temperature.*

7. Water will *expand* when it freezes.

8. *Limestone* and *marble* are types of rock that are affected by chemical weathering.

9. a. List the seven words that you did not use.

   animals
   calcium carbonate
   ice wedging
   mechanical
   plants
   rock
   soil

   b. Write a sentence using three of these words. Try to use the words to show that you understand one way the three words are connected.

   Answers will vary. Sentences should contain any three of the words in (a).

Enrichment

Make the necessary interpretations to answer the following questions.

1. The coal mine underneath Turtle Mountain may have helped to cause the Frank Slide. The night before the slide, the weather was very cold, with a heavy frost. Explain how weathering might also have helped cause the slide.

   The cold weather may have caused some of the rocks on the outside of the mountain to contract. It may also have caused some water to freeze in the cracks, causing rocks to split apart and break loose.

2. What evidence would you look for to help prove or disprove your explanation for question 1? Explain how the evidence would help.

   Answers will vary. Evidence of cracks in the rock might help show what happened.

3. Imagine you work at a garden centre that sells large planters for growing flowers in the summer. You must explain to the people who buy your planters why they should empty them before the winter, or at least make sure the material in the planters is quite dry. Write an explanation for the buyers of your planters.

   The point to be made here is that the water in the soil may freeze on cold nights and expand as it freezes, breaking the planters.

Section 2 Assignment

(34 Total Possible Marks)

1. Make a list of examples of weathering around you. Classify each example as mechanical, chemical, or biological weathering. If you have trouble thinking of examples, go outside, look around, and ask yourself "What is wearing down and why?" You should give three examples for each type of weathering. (18 total)

   Answers will vary. Some sample answers follow.

   a. Examples of Mechanical Weathering:

      - *cracks or broken corners of sidewalks*
      - *rounded corners and chips in individual bricks of brick buildings*
      - *concrete cracking on school foundation*

   b. Examples of Chemical Weathering:

      - *cave formation*
      - *rusting nails*
      - *wearing away of building exteriors of limestone and marble*

   c. Examples of Biological Weathering:

      - *cracks in rocks produced by growing tree roots*
      - *cracks in rocks because of lichen growth*
      - *rocks uncovered by animals and worn away by chemical and mechanical weathering*

2. Choose one of your examples from each type of weathering in question 1. Describe the evidence that helped you classify the example. (6 total)

   Answers will vary. Students can choose any of their examples from question 1. Sample answers follow.

   a. Mechanical Weathering:

      - Example chosen – *worn bricks*

      - Evidence

        Worn bricks are much more in evidence on the side of the building most exposed to wind and rain.

b. Chemical Weathering:

- Example chosen – *rusty nails*
- Evidence

Nails left inside did not rust.

c. Biological Weathering

- Example chosen – *large cracks in rocks*
- Evidence

Roots were found in the rock cracks.

3. Imagine you are doing the following experiment. A plastic container is filled with water and the cover is placed on the container. The container is then put in a freezer. You will examine the container and lid after the water has frozen.

a. Predict what your examination of the container and lid will show after the water has frozen. (3)

The liquid water has expanded to form ice that pushes outward on the sides of the container.

b. Explain how this experiment serves as a model for mechanical weathering. What does this model have to do with what happens in the real world outdoors? (3)

The ice puts pressure on its container and lid just as rainwater enters the cracks in a rock and freezes and expands. This produces larger and larger cracks that may eventually split the rock.

4. Describe two ways that scientists go about trying to improve their explanations. (4)

- *Scientists are always trying to gather more information through more observations to support, modify, or reject their explanations. (2 marks)*
- *Scientists are always testing their explanations by using them to explain and predict natural processes. (2 marks)*

Section 3: Erosion By Water

By the end of this section students should be able to

- recognize evidence of water erosion
- describe and classify sediments
- explain why river courses change
- explain why shorelines change
- describe how a river ages
- compare porosity of soil samples

Section 3: Activity 1

> Note: Students are to do either Part A or Part B.

Part A

Comments:

As the learning facilitator, your assistance in helping the student set up the stream table will be required. If a stream table is not available, you may assist students with doing Part B.

Observations

Answers will vary. The following are example answers.

Flow of Water	Effect on Rock Fragments
dripping	*Some sand grains are moved when the water drops hit them.*
gentle flow	*Some of the sand grains are carried down the slope.*
medium speed	*The sand and some of the small pieces of gravel are carried down the slope.*

Questions to Answer

1. What happened to each size of rock fragment when the water ran slowly?

   - sand *There was some movement of the sand.*
   - gravel *There was no movement of the gravel.*
   - pebbles *There was no movement of the pebbles.*

2. What happened to each size of rock fragment when the water flowed more quickly?

   - sand *There was movement of the sand downslope.*
   - gravel *There was some movement of the gravel downslope.*
   - pebbles *There was little or no movement of the pebbles.*

3. Predict what might happen to each size of rock fragment if you increased the steepness of the slope of the stream table.

   - sand *The sand would move much more quickly.*
   - gravel *The gravel would move more quickly.*
   - pebbles *The pebbles would begin to move.*

4. Describe how you would go about experimenting to test the effects of moving water on different slopes of sand.

   Observe how much of each kind of material is carried when the slope of the stream table is not very steep. Then change the slope and observe again to see how much of each type of material is carried.

Part B

Observations

Answers will vary. The following are example answers.

Speed of Water	Effect on Rock Fragments
very slow	– *some slight movement of sand grains* – *no movement of gravel and pebbles*
slow	– *movement of sand grains* – *slight movement of pebbles* – *no movement of gravel*
medium speed	– *sand grains move more quickly* – *some movement of gravel* – *very little movement of pebbles*

Questions to Answer

5. What happened to each size of rock fragment when the water was moving very slowly?

   - sand — *There was some movement of the sand.*
   - fine gravel — *There was very little movement of the fine gravel.*
   - pebbles — *There was no movement of the pebbles.*

6. What happened to each size of rock fragment when the water flowed more quickly?

   - sand — *Movement of sand became more noticeable and more rapid.*
   - fine gravel — *There was some movement of the fine gravel.*
   - pebbles — *There was slight movement of the pebbles.*

7. Predict what might happen to each size of rock fragment if you swirled the water as fast as you could.

   - sand — *There would be rapid movement of the sand.*
   - fine gravel — *There would be more noticeable movement of the fine gravel.*
   - pebbles — *The pebbles would move along with the other materials.*

8. Imagine that stream *A* flows down a very steep slope through a mixture of sand, pebbles, and fine gravel. Stream *B* flows down a nearly level slope through similar material. Predict what you would expect to see being carried by each of these streams. How can the *jar* model you just used help you predict differences in what will happen to the rock fragments in each stream?

   - *Stream A would likely cause some movement of sand, fine gravel, and pebbles. The movement of sand would be quite rapid.*

   - *Stream B would have very little movement of materials, mainly a very gradual movement of sand grains.*

Section 3: Activity 2

Observations

1. a. Did the big rock fragments settle near the bottom or near the top of the jar?

      They settle mainly near the bottom.

   b. Why?

      They stop moving most quickly. (They are also the heaviest pieces.)

2. a. Did the small rock fragments settle near the bottom or near the top of the jar?

      They settle mainly near the top.

   b. Why?

      They do not stop moving as quickly and they do not settle out as fast because they are smaller and lighter.

Interpretations

3. As a fast river begins to slow down, rock fragments start to settle on the bottom of the river. In what order will the following rock fragments settle?

   sand, fine gravel, silt, pebbles, clay

   List the rock fragments from the first to settle to the last to settle.

first to settle	*clay*
	silt
	sand
	fine gravel
last to settle	*pebbles*

4. Imagine that you are in a valley with no water flowing through it. You are trying to figure out if a river once flowed through the valley. Think about each of the following observations. Look back at the information in this activity if you need help.

   If the observations support the idea that a river once flowed through the valley, write *yes* in the space. If the observations do not indicate that a river once flowed through the valley, write *no* in the space. Then briefly explain your answer.

   a. _*Yes*_ You find lots of smooth, well-rounded pebbles and gravel.
   Explanation:

   Pebbles are found where they are laid down by rivers. Pebbles are smoothed and rounded as they rub against each other in the stream bed.

   b. _*Yes OR No*_ There are lots of bushes and grass.
   Explanation:

   The grass and bushes could be growing on soil and sediments laid down by the river. They may also have been deposited in another way.

   c. _*Yes*_ The valley is shaped like a large "V."
   Explanation:

   This is the shape of a young river valley.

   d. _*Yes*_ There is a lake shaped like a "C," with no water flowing into or out of the lake.
   Explanation:

   This is a place that once was a part of a river (an oxbow lake).

   e. _*No*_ There is a very large boulder, about the size of a large truck, sitting on the ground.
   Explanation:

   Rivers cannot move material this size.

5. Think back to the experiments you did with rock fragments and water. Describe what the sediments in a **delta** might look like if you dug down. What kind of material might be found in the delta? What kind of material might be found farther out in the water, just beyond the delta?

   One might expect to find a variety of materials carried by rivers, including gravel, sand, silt, and clay. The smaller sized materials tend to be carried further out.

Section 3: Activity 3

In the space provided, describe changes that can occur in shorelines. Use diagrams if you wish. In your description, show that you understand the difference between erosion and deposition and how they work together to change shorelines.

Answers will vary.

Shoreline movement involves the movement of sediments from one location to another, caused by the action of currents. The action of waves can help break down the shoreline in one area and can also serve to help wash up the materials on another shore.

The two main processes involved are erosion, which is the process by which shoreline materials are broken down and picked up by the water, and deposition, which is the process in which the materials settle out of the water, usually in a place different from where they started.

Section 3: Activity 4

Comments:

Dry clay is often difficult to obtain as a soil since water makes it stick together in hard lumps. Collect the clay beforehand and allow it to dry. Then smash the lumps with a hammer before using the clay in this investigation.

Observations

Soil Sample	Amount of Water Added (mL)
dry gravel	*Answers will vary. Usually the dry clay will absorb the least water, since there are only small spaces between the fine particles of clay. Gravel should hold the most water as larger particle sizes have larger spaces between them.*
dry sand	
dry potting soil	
dry garden soil	
dry clay	

Questions to Answer

1. List the soil samples from highest porosity to lowest porosity.

   highest porosity

   Answers will vary. Answers should be consistent with the results given in the Observations chart. Gravel should have the highest porosity and clay the lowest porosity.

   lowest porosity

2. a. Through which type of soil material will water flow quickest?

   Usually water will flow quickest through the gravel.

   b. Why?

   Generally, there is a lot of space between pieces of gravel.

3. a. Predict how much water you could add to a sample that was half gravel and half sand.

   Answers will vary. Students will likely predict a result halfway between the two results obtained in the Observations chart, but the result will probably be different than predicted.

   b. Try mixing equal amounts of sand and gravel. Then add water to fill the container. What amount of water did you need to add?

   The result will be less than for sand or gravel.

   c. Was this what you expected? *Answer can be yes or no, depending on the prediction in a..* If it was different, try to explain the difference.

   The sand filled some of the spaces between pieces of gravel.

4. a. Which type of soil would have most runoff after a rainfall?

   Most likely the clay will have the most runoff.

   b. Explain why.

   The clay would likely be least able to absorb all of the water.

5. a. Which type of soil would contain the most groundwater after a rainfall?

   Most likely the gravel would contain the most ground water.

   b. Explain why.

   There are more large spaces in the gravel than for other materials.

Section 3: Activity 5

Comments:

Large baking trays may work well as the container to hold the sand and water. However, if students are finding that baking trays are not deep enough, then they may wish to try a baby's bathtub to see if it works better.

Clean, course sand works best for this investigation as it allows water to flow quickly through it.

Observations

1. When water was first poured onto the sand, where did it go?

   It went directly into the sand, filling in the spaces between the particles. The excess water settles at the bottom of the container and then begins to accumulate.

2. Which hole first showed water?

   Answers will vary. If the sand used is not very clean, the deeper hole or well most likely showed water first since it is closest to the water source. However, if the sand that was used was clean (that is, it didn't have finer materials filling in the spaces between the particles), then the lowest depression (the lake) likely showed the water first.

3. Where did water appear next?

   Answers will vary. Water would most likely have appeared next in the "lake" or "slough," if the student said water had appeared first in the deep well in the answer to question 2.

4. Where did water appear last?

   Most likely the water appeared last in the shallow well.

Interpretations

To answer questions 5 to 10, you will need to apply what you learned about the behavior of groundwater from your model set up.

Read the captions and examine diagrams (**a**), (**b**) and (**c**) on page 331 of your textbook. Answer the following questions which help explain the behavior of the groundwater in Johann's and Cheryl's camp as shown in the diagrams.

5. When the rain fell in the spring, what happened to it?

   Some of the water became runoff, but most went into the ground. It filled the wells, the lake, the slough, and the stream.

6. How did water get into the wells, streams, and slough?

   It travelled through the ground. Groundwater collects underground and raises the water table. The sloughs and streams are depressions in the ground. The water table meets the surface here.

7. Why was one of the wells dry when Cheryl visited the camp?

   The water table had dropped during the summer.

8. What happened to the slough in the summer?

   It went dry.

9. How does the *water table* model help explain the appearance and disappearance of surface water?

   The water appears and disappears as the water table rises and falls.

10. Why do scientists use models?

    Answers will vary. Models help us gain ideas about how the real world works. Models can help us understand what we see. Often they are useful in predicting what will happen as conditions change.

Section 3: Follow-up Activities

Extra Help

Look at the following word list. If you do not know what a word means, look back through this section to find out how the word is used.

Word List

boulders	observation	shore
canyon	oceans	shoreline
clay	oxbow	silt
delta	pebbles	snow
deposition	pores	soil
erosion	porosity	steep
flood	rain	stream
gravel	river	surface
groundwater	rock	table
inference	runoff	tributaries
lake	sand	water
meandering	sediments	weathering
model	soil	valley

Once you think you understand the words, test yourself by doing the following crossword puzzle. Some of the clues may seem to fit more than one word. You will not use all the words. A word is used only once in the crossword puzzle. Do the crossword, using a pencil so that you can change words to make everything fit.

Across Clues

4. sediment larger than sand

7. a form of moving water that causes erosion on the Earth's surface

8. sediment larger than sand

9. Runoff is called *surface* water.

11. one source of runoff

13. what waves erode

14. the type of river that winds back and forth on a fairly level surface

15. a collection of sediment often found where a river enters an ocean

16. wearing away of rock and the moving of the rock fragments from one place to another

18. a source of runoff

19. A river flowing down a *steep* slope carries lots of rock fragments.

20. what happens when more runoff enters a river than it can hold

23. the holes into which groundwater seeps

24. the name for streams that flow into rivers

Down Clues

1. As a stream or river slows, rock fragments settle to the bottom.

2. a lake formed from a meandering river

3. sediment smaller than sand

4. water contained in the soil

5. one place where a delta might form

6. rock breaking down into smaller pieces

10. a landform that has very steep sides, caused by river erosion

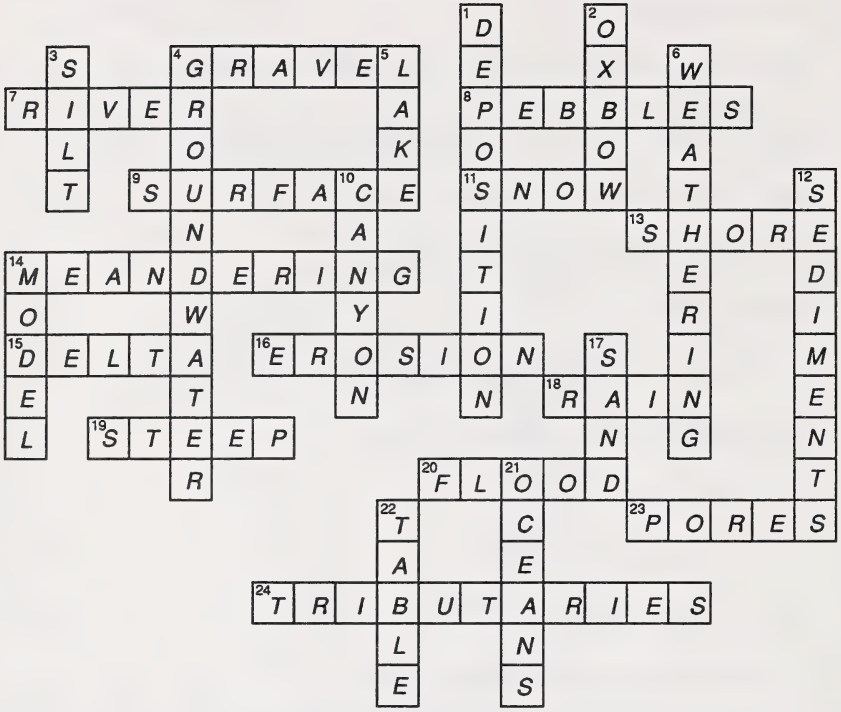
12. rock fragments deposited by a river

14. A stream table can be used to make a *model* of a river.

17. sediment larger than clay and silt

21. the largest bodies of water on Earth

22. The water *table* is the level at which the soil cannot hold any more groundwater.



Enrichment

Comments:

For this activity students are to follow the instructions for Activity 6-6 which is described on page 313 of *Science Directions 7*. Leadshot was suggested as the substitute for gold. Another substitute that can be used is small fishing weights. These may be cut with scissors to make "gold nuggets" of various sizes. After completing steps 1 to 5 given under the Procedure, students are to make the necessary interpretations to answer some questions.

1. Why were you able to separate the "gold" from the other rock fragments?

   The "gold" is heavier and tends to settle in the bottom of the pan.

2. What force pulls particles to the bottom of moving water?

   Gravity pulls particles to the bottom of moving water.

3. What force keeps particles from settling out of the water?

   The force of the moving water keeps particles from settling out. (Some students might mention that lighter particles are more buoyant than heavier particles.)

4. How do these two forces act together to allow you to find and remove the lighter substances after swirling them around in the water?

   The lighter substances are carried by the water and the heavier substances settle out.

5. Imagine that you find an old river bed where a river once was but has now dried up. How could looking at the sediments help you infer what the size and speed of the river used to be?

   The larger the sediments, the faster the stream was; the smaller the sediments, the slower the stream was.

Section 3: Assignment

(21 Total Possible Marks)

1. Explain how a delta is formed. (4)

   A river flows into a peaceful lake or sea (1 mark) and slows almost to a stop. (1 mark)
   The river deposits most of its sediment at the place where it enters the lake or sea. (1 mark)
   Over time, the sediments build up and form a triangular piece of land – a delta. (1 mark)

2. Imagine that you have found a delta, but the river has dried up. Describe what you could learn about the river by carefully observing the sediments from the delta. (3)

   By an examination of the sediments, you could learn something about the amount of water in the river, the speed at which it flowed, and the types of areas through which it flowed.

3. Why does a water well sometimes dry up, then later have water in it again? (3)

   If there is a drought, the level of the water table falls. More rain or melted snow can raise the level of the groundwater.

4. A river is said to sort sediments. How does this occur? (3)

   As a stream slows, the rock fragments are deposited according to their size. (1 mark)
   They settle in the following order, from heaviest to lightest: pebbles, fine gravel, sand, silt, and clay. (2 marks)

5. Describe two observations that would make you think that water erosion has occurred. Give explanations for each. (8 total)

   Answers will vary. The following are sample answers. Please award two marks for each observation, and two marks for each explanation.

   - Observation:

     smooth, well-rounded pebbles

     Explanation:

     Pebbles are smoothed and rounded as they rub against each other in a streambed.

   - Observation:

     Rocks have been sorted by size, with large rocks in one area and pebbles in another.

     Explanation:

     Rivers deposit different sizes of sediments in different areas.

Section 4: Erosion by Wind

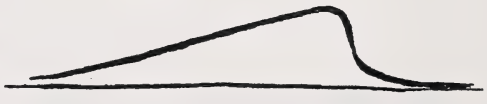
By the end of this section students should be able to

- identify the features that result from wind erosion
- understand how wind erosion affects Alberta and how it can be controlled

Section 4: Activity 1

Observations

Answers will vary, but should be similar to those shown.

Before Blowing Dry Sand	After Blowing Dry Sand
	

Observations (continued)

Before Blowing Wet Sand	After Blowing Wet Sand
	 *(little or no change)*

Interpretations

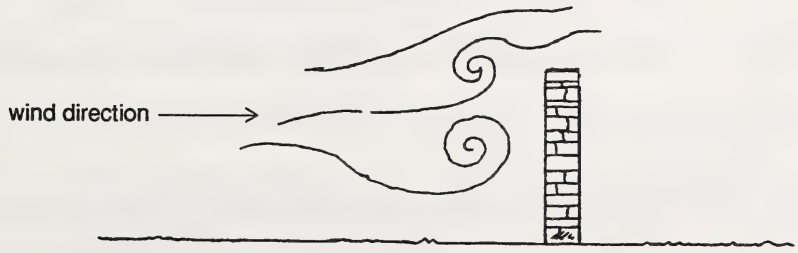
1. What are the two most important factors you have discovered that determine how much wind erosion occurs in a certain area?

   - *the speed of the wind*
   - *the dryness of the soil*

2. Predict how a sand dune might move if the wind continues to blow in the same direction for a long time.

   Answers will vary. Likely the dune will be moved downwind.

3. Predict what will happen to soil being carried on the wind if the wind meets a solid object, such as that depicted in the following diagram.



Some of the soil is likely to be deposited on the downwind (leeward) side of the obstacle, but very little, if any, on the upwind (windward) side.

Section 4: Activity 2

Comments:

If it is wintertime and soil particles of different sizes, such as sand and garden soil aren't readily available, students can try using other easily available materials, such as a mixture of uncooked rice and other cereal grains, to represent the soil samples. To help speed the cleanup after the investigation students can place open sheets of newspaper on the area where this investigation is to be done.

Observations

Answers will vary. When the blower is turned on, it is likely that some of the soil materials will be moved, especially if they are dry. Some of the finer material and organic matter are likely to be moved the first and also the farthest.

Observations (continued)

Answers will vary. When the obstacle is placed in the path of the wind made by the blower, the material carried along by the wind is largely deposited on the downwind side of the obstacle.

Interpretations

1. Explain why some soil samples were blown farther than others (step 2).

   This usually depends on the size of the particles and also whether the particles are mineral material or some form of organic material.

2. Predict what would have happened if you had used the hair dryer at a higher speed.

   Likely the movement would have been greater. More material would have moved and it would have been transported a greater distance.

3. Predict what would have happened if you had dampened the soil samples before you used the hair dryer.

   Likely the materials would not have moved as far.

4. Explain what happened when the cup was placed in the path of the wind.

   The cup caused an area where the wind was blocked. In this area, the material could fall and stay without being blown away again.

5. How could planting trees reduce soil erosion by the wind?

   Trees would help by creating wind blocks, or at least they would slow down the wind in the area near them.

Comments:

Note: There are no Follow-up Activities for this section.

Section 4: Assignment

(20 Total Possible Marks)

1. What evidence do you have that wind causes erosion? Describe two examples. (4)

   Answers will vary. Two sample answers follow. Student answers should reveal a critical understanding of the effects of wind erosion.

   - *Plants that normally grow tall cannot take root where wind has blown soil away, or the plants become low and spreading when high winds are frequent.*
   - *Drought conditions result from local winds affecting soil moisture and humidity. Soil drifting occurs in these areas.*

2. What is one way that water erosion and wind erosion are the same? (2)

   Answers will vary. Any one of the following answers is satisfactory.

   - *Both water and wind erode rock particles.*
   - *As the effect of moving water on the rock fragments of different sizes varied with the amount of water and the speed it was flowing, the amount and speed of the wind varies its effect on soil pieces of different sizes.*

3. What is one way that water erosion and wind erosion are different? (2)

   Answers will vary. Sample answers follow.

   - *Wind erosion blows loose sand into ripples, while water erosion leaves branching patterns.*
   - *Rock pieces from wind erosion often have sharp edges while rock pieces from water erosion have rounded and smooth surfaces.*
   - *Wind erosion moves materials much greater distances than water erosion does.*

4. What are two factors that increase the amount of wind erosion? (4)

   - *the greater the speed of the wind*
   - *the dryness of the soil*

5. a. Describe one way to reduce erosion of soil by the wind. (2)

   Answers will vary. The following is a sample answer. The planting of trees or cover crops can reduce erosion.

   b. Explain why this method works. (3)

   Trees and other plants create wind blocks and slow down the wind in the area near them. Also the root systems hold the soil together.

6. The first human footprint made on the surface of the Moon is still there, many years after it was made. What can you infer about the Moon from this observation? (3)

   Answers will vary. Student answers should reveal creative and critical thinking skills. A sample answer follows.

   There is no water on the moon; therefore, any surface materials are very dry. If there were any wind present, the materials would be blown and the footprint erased. There must not be any wind on the moon.

Section 5: Erosion By Glaciers

By the end of this section students should be able to

- describe how glaciers develop
- describe how glaciers move
- identify the range and location of glaciers, past and present
- infer erosion by glaciers from landscape features

Section 5: Activity 1

Interpretations

1. Observations made during the last 100 years show that valley glaciers are getting smaller. What would have to change for them to start getting larger and moving farther out into valleys?

   The climate would need to become colder and/or snowfall would need to increase.

2. What is the same about valley glaciers and continental glaciers?

   They are both formed from snow that builds up into thick layers of ice. They would both move due to gravity and pressure.

3. What is different about valley glaciers and continental glaciers?

   Continental glaciers have very little movement, whereas valley glaciers move downslope.

4. Why are valley glaciers called *rivers of ice*?

   They are called this because they move gradually downslope, the way a river would.

5. Why is it hard to believe that glaciers are spreading across continents or flowing down valleys?

   The movement of glaciers is so slow that it often is not directly observed. Also, the front of the glacier may seem to stay in one place as the melting keeps pace with the advance of the glacier.

Section 5: Activity 2

Comments:

Students are to examine the illustration on the bottom of pages 334 and 335 of the textbook to answer the questions in this activity.

1. a. In which part of the illustration was the **snout** of the glacier **stationary**?

      The two centre pictures show a stationary glacier.

   b. What weather conditions must be present for a glacier to be stationary?

      The weather must be neither very warm nor very cold. Over time the snow falling must equal that melting.

2. a. In which part of the illustration was the front of the glacier **advancing**?

      The two pictures at the left show an advancing glacier.

   b. What weather conditions are likely present for a glacier to be advancing?

      The weather must be fairly cool or cold. Snowfall must exceed the amount melting.

3. a. In which part of the illustration was the front of the glacier **retreating**?

      The two pictures at the right show a retreating glacier.

b. What weather conditions are likely present for a glacier to be retreating?

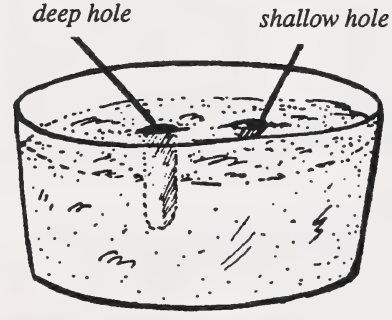
The weather must be fairly warm or hot. The amount of ice melting must be greater than the snowfall accumulating.

Section 5: Activity 3

Comments:

- In additon to ordinary ice cubes, students will need to prepare some ice cubes made from water mixed with coarse sand, and some made from water mixed with gravel. These should be prepared beforehand so that they are ready when the student is doing this activity.
- Students may use diagrams as part of their description of what they observed.

Observations



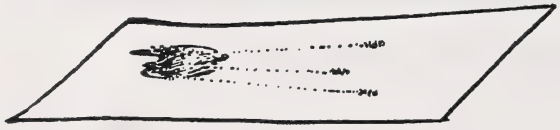
For the ice cube that was buried, a fairly deep hole was formed. For the ice cube that was pressed into the sand, a shallow hole was formed.

Observations (continued)

Clear Ice Cube

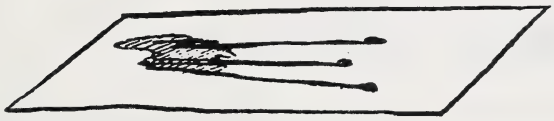
The only effect of the ice cube was to make the cardboard a bit wet.

Ice Cube with Sand Frozen in It



The sand made small scratches in the cardboard.

Ice Cube with Gravel Frozen in It



The gravel made some fairly deep scratches in the cardboard.

Questions to Answer

1. Which parts of this activity simulated making striations?

   The moving ice with the sand and gravel inside simulated making striations.

2. Which parts of this activity simulated making kettle lakes?

   The ice cubes left to melt in the sand simulated making kettle lakes.

3. a. Which pieces of evidence show the direction that a glacier was moving before it melted?

      The scratches (striations) show the direction of movement.

   b. How do they show the direction?

      The lines go in the same direction as the movement.

4. Describe one way that river erosion is similar to erosion by glaciers.

   Answers will vary. River erosion can cause the movement of materials from one place to another.

5. Describe one way that river erosion is different from erosion by glaciers.

   Glaciers can move larger materials.

6. Consider what you have learned about how glaciers form and move. Explain how large rocks can be moved many kilometres to areas where there are no glaciers?

   Glacial movements pushed the boulders to their present location. Then the glaciers melted back from where they once were.

Section 5: Follow-up Activities

Extra Help

1. How can an advancing glacier carry rocks down the valley?

   An advancing glacier can push rocks at its front as well as carry rocks on top, inside, and under the glacier.

2. How can a stationary glacier carry rocks down the valley?

   The glacier is moving downslope even as the front of the glacier is retreating. Materials can be carried on, in, or under the glacier.

3. What force makes a glacier move down a valley?

   Gravity moves the glacier down a valley.

To simulate how a continental glacier flows outward, form some modelling clay into a block that is about 5 cm on every side. Place the block on a sheet of paper and trace the outline of the block. Add some weight to the top of the modelling clay block (a small book will work). Leave the clay for 15 minutes. Trace the outline around the clay again. Peel the clay off the paper and compare the outlines.

4. Describe how the modelling clay changed.

   If the weight was sufficient, the modelling clay spread out as it was flattened by the weight.

5. What would cause a continental glacier to quit spreading outward?

   If there were not enough snow to keep pace with the yearly rate of melting, the glacier would stop spreading.

6. Following is a list of landscape features mentioned in this module:

deltas	rounded pebbles
drumlins	rough-edged pebbles
erratics	sand dunes
kettle lakes	V-shaped valleys
moraines	wide U-shaped valleys
oxbow lakes	

   List the six features that would indicate that a glacier has been present.

   - *drumlins*
   - *erratics*
   - *moraines*
   - *kettle lakes*
   - *U-shaped valleys*
   - *rough-edged pebbles*

Enrichment

Note: Students may do either Part A or Part B, or they may do both Part A and Part B.

Part A: Researching Glacial Features

Two features caused by a glacier are a cirque and an esker. Do some research; then describe what each looks like and how each was made by a glacier. Use the space provided.

A cirque is a rounded, bowl-shaped valley formed on the slope of a mountain by a mountain glacier.

An esker is a winding ridge of sediment (sand, gravel, and so on) believed to have been deposited by meltwater streams flowing under retreating Ice Age glaciers.

Part B: Researching a Part of Alberta Not Covered by Glaciers During the Last Ice Age

The tops of the Cypress Hills in Alberta and Saskatchewan were not completely covered with ice during the last Ice Age. Some of the plant and animal species living today in the Cypress Hills are different from those in the surrounding lowlands. How can you explain these differences? First, propose your own explanation based on what you have learned in this section. Then try to find one in a library. A book that describes the geography of Alberta or one that describes the geology of Alberta may be a good source. Was your explanation similar to the one you found?

Answers will vary. The main idea students should develop is that the life forms that existed before glaciation were for the most part displaced from Alberta, except in the Cypress Hills area.

Section 5: Assignment

(25 Total Possible Marks)

1. Describe two ways you could prove that a valley glacier is moving down a valley rather than remaining stationary. (4)

   - *If a marker is placed on the glacier, it can be seen to have moved a year later.*
   - *As the glacier advances, it scratches the rock and ground beneath it. New striations appear when the glacier melts back.*

2. a. Which is likely to move faster: a valley glacier or a continental glacier? (1)

   A valley glacier is likely to move faster than a continental one.

   b. Explain why. (3)

   The steepness of the slope of the valley glaciers allows for greater effect of the force of gravity, which causes the glacier to move faster.

3. How can a glacier carry sediments down a valley when the glacier is getting shorter? (4)

   The glacier is moving downslope even as the front of the glacier is retreating. (2 marks) Materials can be carried on, in, or under the glacier. (2 marks)

4. Scientists claim that the glacier at Lake Louise once reached all the way to Calgary. Name and describe three landscape features that you would look for to support this claim. (6)

   Answers will vary. A sample answer follows.

   - *Look for the presence of large boulders in an open field. These boulders are much too large to be moved by wind or water. Only a glacier could transport a large boulder.*
   - *The presence of long, parallel scratches on rock where soil has been is evidence of glacier action as the bottom layer moves rock fragments that push aside the soil and scratch the surface beneath.*
   - *The presence of a U-shaped valley is evidence that a glacier has eroded the rocks on the bottom of the valley and also on the sides.*

5. Describe how glaciers cause erosion. (4)

   Glaciers cause the movement of materials from one place to another. A glacier scrapes off and carries along native soil, weathered rock fragments, and stream deposits. This moving mass changes the landscape as it goes, producing such effects as U-shaped valleys, striations, kettle lakes, eskers, and drumlins.

6. Rocks that are moved by a glacier usually look different from those moved by running water. How do you think they might look different? (3)

   Answers will vary. Student answers must show an understanding of the effects of a glacier on the materials it transports. Rocks moved by glaciers would not be smooth and rounded as those moved by running water. Glacial rocks are often found in ridges and are often deeply scratched.

Comments:

- A final grading for Module 6 can be determined at this point.
- The student should now be reviewing all previously completed modules in preparation for the final test.

Final Test

There are two copies of the final test: the student's copy which is perforated and designed for photocopying and possible faxing and the teacher's copy which includes a marking guide.

Note:

The student's copy and the teacher's copy of this final test should be kept secure by the teacher.
Students should not have access to this test until it is assigned in a supervised situation.
The answers should be stored securely and retained by the teacher at all times.

SCIENCE 7

FINAL TEST

GENERAL INSTRUCTIONS

YOU HAVE TWO HOURS TO COMPLETE THIS TEST. Work through the entire test answering the questions you are sure you know. You will then be able to concentrate on the questions of which you are not quite sure.

TOTAL MARKS: 100

PART A: Multiple Choice – 35 marks
PART B: True or False – 15 marks
PART C: Short Answer – 50 marks

TEACHER'S COPY

PART A: MULTIPLE-CHOICE QUESTIONS

Value Part A is worth 35 percent of the total examination mark.

All multiple-choice questions must be answered on the Part A: Response Page included in your test.

Read each question carefully and decide which of the choices BEST completes the statement or answers the question. Locate the question number on the Response Page and place the appropriate letter in the space provided.

1 each

_B_ 1. The word that best describes a push or pull that causes an object to move, or stop, or change its speed or direction is

A. resistance
B. force
C. friction
D. inertia

_D_ 2. When a large river carrying sediments enters a standing body of water, the feature that may eventually form is a(n)

A. tributary
B. floodplain
C. oxbow
D. delta

_A_ 3. Hoodoos, or caps of hard rock on top of columns of softer rock, are probably formed by the action of

A. water and wind erosion
B. valley glaciers
C. earthquakes
D. volcanoes

_C_ 4. A cactus has shrunken leaves that look like spines. These needle-like leaves prevent water loss. This is an example of a(n)

A. behaviour adaptation
B. involuntary response
C. structural adaptation
D. voluntary response

A 5. An astronaut on the moon is about to drop a piece of notepaper and a book. She says the book will hit the ground first. She has made a(n)

A. hypothesis
B. observation
C. conclusion
D. theory

C 6. At room temperature a metal ball will just fit through a metal ring. If the ball was cooled under cold water, which of the following would you observe?

A. The ball would not be able to pass through the ring.
B. The ring would decrease in size.
C. The ball would pass through the ring more easily.
D. The ball would increase in size.

B 7. Different kinds of balls are pushed to the bottom of a bathtub. Predict which ball will **not** float to the surface.

A. styrofoam ball
B. steel ball
C. ping-pong ball
D. tennis ball

A 8. If 200 mL of water at 20°C were added to 100 mL of water at 80°C, the final temperature of the mixture would be

A. closer to 20°C than to 80°C
B. closer to 80°C than to 20°C
C. half way between 20°C and 80°C
D. close to 100°C

D 9. In doing a scientific investigation which of the following processes would you do first?

A. Control the variables.
B. State a conclusion.
C. Select the materials needed.
D. Make a hypothesis.

C 10. A tied inflated balloon increases in size with an increase in temperature because

A. more air molecules enter the balloon
B. the air molecules in the balloon increase in size
C. the air molecules in the balloon move further apart
D. the air molecules decrease in size as the spaces between them become larger

B 11. To calibrate a thermometer means to

A. shake a clinical thermometer before using it
B. make a scale of numbers or units on the thermometer
C. check the accuracy of the thermometer
D. heat and cool the thermometer to see if it is working properly

C 12. A solid differs from a liquid in that the molecules of a solid

A. move more slowly and are further apart than those of a liquid
B. move more quickly and are closer together than those of a liquid
C. move more slowly and are closer together than those of a liquid
D. move more quickly and are further apart than those of a liquid

A 13. Deposition is a process in which rock particles

A. settle down after being carried by wind or water
B. are broken into smaller pieces
C. are changed chemically by natural substances in the rock
D. are worn away and moved from place to place

B 14. An example of a slow change is

A. the formation of a gully as a result of runoff during a heavy rainfall
B. canyon formation
C. an avalanche
D. a landslide

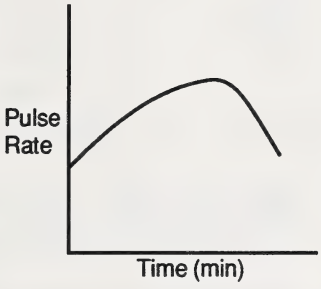
D 15. Small differences in size, shape, colour, or behaviour among individuals of a species are known as

A. adaptations
B. characteristics
C. responses
D. variations

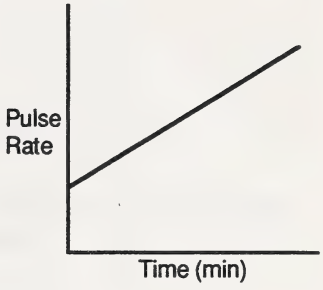
TEACHER'S COPY

A 16. Which of the following graphs would best show the relationship between your pulse rate and the time exercised if you exercised for 5 minutes, then rested for 5 minutes?

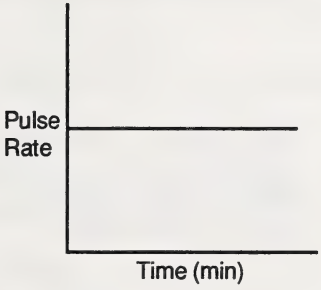
A.



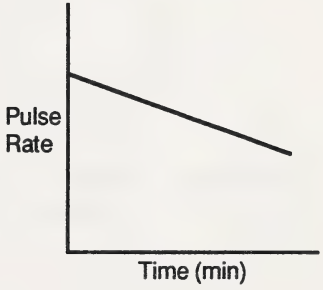
C.



B.



D.



D 17. The correct order of the stages of a housefly's life cycle is

A. adult, egg, pupa, larva
B. larva, adult, egg, pupa
C. pupa, adult, larva, egg
D. egg, larva, pupa, adult

D 18. A response to a stimulus is shown by

A. a hand being pulled back quickly upon touching a hot object
B. a moth flying towards light
C. a plant growing towards a light source
D. all of the above

B 19. Your socks stick together when coming out of the dryer. You are observing

A. magnetism
B. electrostatic forces
C. gravity
D. buoyancy

TEACHER'S COPY

A 20. A 100 g object exerts a force of

A. 1 N
B. 10 J
C. 100 N
D. 100 J

C 21. The slower the water in a stream flows, the

A. greater the number of large particles it will carry
B. greater the number of smaller particles it will carry
C. fewer the total number of particles it will carry
D. fewer the number of large particles that it will deposit

B 22. A honeycomb of a beehive and a brick wall show similarity in design by being

A. held together by a similar type of substance
B. made of a single shape that is repeated over and over
C. made of the same materials
D. built in a similar fashion

A 23. The major reason for making a scale model of a bridge would be to

A. test the design of the bridge for strength
B. test the materials to be used in the actual construction
C. estimate the costs of construction of the bridge
D. see if the bridge is visually attractive

C 24. The rules or written instructions that define the requirements for a plan or structure are

A. prototypes
B. trusses
C. specifications
D. alloy

C 25. During a time known as the "Dirty Thirties," erosion problems resulted mainly due to

A. very hot summers with frequent hail storms
B. swarms of grasshoppers and lack of rain
C. wind and lack of moisture
D. flooding

TEACHER'S COPY

A 26. Moulds are a type of fungus. Some moulds break down wastes and dead materials and return the nutrients to the soil. The micro-organisms described here are classified as

A. decomposers
B. consumers
C. producers
D. composers

A 27. Many people consider food preserved in a natural form to be more appetizing. Which point of view is represented by the statement?

A. aesthetic
B. economic
C. environmental
D. scientific

B 28. A family needs a license to open a new restaurant in a small town. The level of government which is responsible for issuing such a license is

A. federal
B. provincial
C. municipal
D. town office

C 29. The two groups of micro-organisms which are responsible for most of the health problems caused by micro-organisms are

A. protozoa and algae
B. bacteria and fungi
C. viruses and bacteria
D. algae and viruses

B 30. A carton of milk is left out for several hours on a warm sunny day. Which of the following statements is true?

A. The milk will be safe to drink because the carton protects the milk from micro-organisms landing on it.
B. The milk may not be safe to drink because the heat from the sun causes micro-organisms to multiply.
C. The milk will be safe to drink because all the conditions which are required in order for micro-organisms to grow were not met.
D. The milk will be safe to drink because it takes days, not hours, for food to spoil.

TEACHER'S COPY

C 31. Which of the following is not a fermented food?

A. chocolate
B. yogurt
C. grapes
D. cheese

A 32. The type of food poisoning caused when micro-organisms are not properly destroyed before being sealed in jars during the canning process is

A. botulism
B. gastroenteritis
C. salmonellosis
D. staphyloccal food intoxication

C 33. The smallest kind of micro-organisms, considered by some scientists to be non-living are

A. bacteria
B. algae
C. viruses
D. protozoa

B 34. The energy content of foods and fuels can be measured in units called

A. grams
B. joules
C. newtons
D. litres

D 35. You want to find out which is easier to pull – a wooden toboggan or an aluminum toboggan of the same design. Which variable is being manipulated in this situation?

A. design of the toboggans
B. force of the pull
C. temperature of the snow
D. materials used in the construction of the toboggans

PART A: RESPONSE PAGE

B	1.	B	19.
D	2.	A	20.
A	3.	C	21.
C	4.	B	22.
A	5.	A	23.
C	6.	C	24.
B	7.	C	25.
A	8.	A	26.
D	9.	A	27.
C	10.	B	28.
B	11.	C	29.
C	12.	B	30.
A	13.	C	31.
B	14.	A	32.
D	15.	C	33.
A	16.	B	34.
D	17.	D	35.
D	18.		

PART B: TRUE OR FALSE

Value Part B is worth 15 percent of the total examination mark.

Indicate whether the statements are true or false with capital letters **T** or **F** in the short blanks to the left of the numerals on the response page. On the lines to the right of the appropriate numerals, indicate how the false statements can be changed to make them true.

1 each

1. All micro-organisms are single-celled.
2. Weathering carries away rock fragments from the land.
3. Porosity of soil refers to how much space there is between the particles which make up the soil.
4. The particle theory of matter is useful in explaining the effect of heat on solids, liquids, and gases.
5. A geyser provides evidence of solar energy.
6. When the snout of a glacier moves further down a valley each year, it is said that the glacier is retreating.
7. A bimetallic strip bends when it is heated or cooled.
8. Weight changes according to the force of gravity.
9. The mass of a beam cannot be reduced without reducing its strength.
10. Many of the manufactured structures are actually designed along the lines of structures found in nature.
11. In a suspension bridge, the cables are under compression and the piers are under tension.
12. For every action there is an equal but opposite reaction.
13. It is necessary to use heavy and strong materials for the construction of structures that are to be used in space.
14. When building a bridge across a river, environmental impact should be one of the factors to be considered.
15. Changes in taste, texture, smell, and appearance are indications that micro-organisms have been used in a food production process.

TEACHER'S COPY

PART B: RESPONSE PAGE

F 1. *Some micro-organisms are multicellular.*

F 2. *Erosion carries away rock fragments from the land.*

T 3.

T 4.

F 5. *A geyser provides evidence of geothermal energy. or Sunlight provides solar energy.*

F 6. *The glacier described is advancing, not retreating.*

T 7.

T 8.

F 9. *The material in the centre of a beam can be reduced without weakening the beam.*

T 10.

F 11. *The cables are under tension and the piers are under compression in a suspension bridge.*

T 12.

F 13. *Structures for space should have as little mass as possible due to the tremendous costs to get the materials into space; or because of low gravity no load-bearing structures are necessary in space.*

T 14.

T 15.

PART C: SHORT ANSWER

Value Part C is worth 50 percent of the total examination mark.

Answer the following questions. Put your responses in the appropriate spaces on the response pages provided.

Be sure to read and think about each question thoroughly before you respond.

2 1. To survive the Canadian winter some organisms either **hibernate** or **migrate**. Explain what each of these two words mean, and give an example of an organism that hibernates and one that migrates.

2 2. Explain the difference between **instinctive behaviour** and **learned behaviour**. Give an example of each type of behaviour.

2 3. In autumn, leaves fall from trees to the ground. Should these leaves be classified as living or non-living, or should they be placed into another classification category? Explain your answer.

PART C: RESPONSE PAGE

Comments:

The answers given here are as a guide only. The examples that students give in their answers may be different from those given here. In some cases the answers given here may contain more information than what students will give.

1. *Migration involves the movement of animals from one area to another when conditions become unfavourable. For example, many Canadian birds migrate to warmer countries at the end of summer.*
   Hibernation involves animals passing the winter in a resting state. Their body processes slow down and stored body fat supplies all the energy needed. Ground squirrels, or gophers, hibernate.
   (The examples given by students will vary.)

2. *Instinctive behaviour involves complex patterns of responses which do not need to be learned. The organism is born with the ability to behave in a certain way. For example, birds build nests, and insects find food in quite involved ways.*
   Learned behaviour requires thought processes. Most learned behaviour comes from imitating a model, such as a parent, and is acquired through repetition. For example, people are not born with the ability to ride a bike; it is a skill that needs to be learned.

3. *Leaves which have fallen to the ground are neither living nor non-living. They are classified as dead, because they no longer have all the characteristics of living things, even though at one time they were alive. Non-living would mean that the leaves had never been alive, which is not the case.*

1 4. What ability do the following organisms have in common that helps them to survive in their environment?

- walking stick insect
- tiger
- zebra

1 5. Why do plants on land have hard and strong stems while the stems on plants found in water are limp and soft?

2 6. Suppose you want to strengthen a screen door. To do this you want to use one piece of wood. On the rectangular door frame shown, draw how you would place the board to give the frame the most strength. Explain why you would place the board where you did.

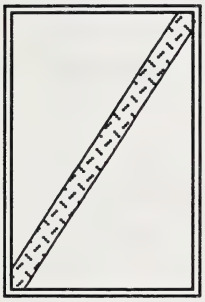
2 7. When planning how to place a beam that is intended to support a load, should you sit it on its wider or narrower edge? Why?

1 8. Why should hot water not be poured directly into an ordinary drinking glass?

PART C: RESPONSE PAGE

4. *These organisms have the ability to hide in their environment and look almost invisible. The tones and patterns of their bodies blend in with the plants in their surroundings. The term applied to this ability is camouflage.*

5. *Land plants require strong stems for support, while water plants use buoyancy for support and therefore do not require strong stems.*

6. 

The board should be placed diagonally to form triangle shapes. Triangle shapes add strength as they cannot be made to slant or sway easily.

7. *The beam should be placed on its narrower edge. The material is thicker, therefore stronger, when placed on its narrower edge.*

8. *The part of the glass that comes in contact with the hot water will become heated before the rest of the glass. The heated part will expand and the stress that is set up will cause the glass to crack.*

4 9. Suppose you were to design a desk and a chair for your room. List at least four factors you would need to consider in your design.

2 10. Explain the following observations.

a. The magician pulled the tablecloth out from under all the dishes without breaking even one.

b. Nolan was not wearing his seat belt and when his father braked suddenly, Nolan was thrown forward out of his seat.

1 11. Explain why the water table may be at different levels at different times.

PART C: RESPONSE PAGE

9. *Answers will vary. The following factors would need to be considered.*

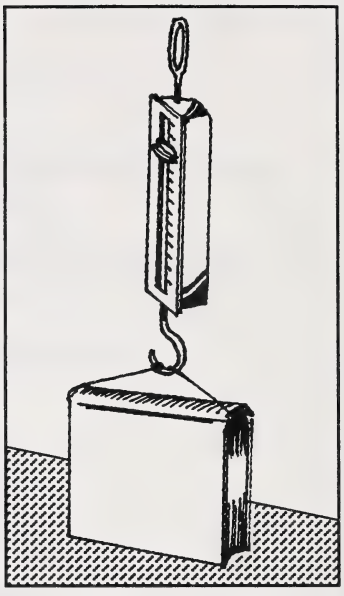
   - *functions of the desk and chair*
   - *cost of material*
   - *strength of materials*
   - *appearance or attractiveness of materials*
   - *size and shape of desk and chair*
   - *ease of use of the materials*

10. a. *Objects at rest have inertia; that is, objects at rest tend to stay at rest. In this case the dishes tended to stay where they were.*

    b. *Objects in motion have inertia; that is, objects in motion continue to move at the same speed and in the same direction unless an unbalanced force acts on them. Nolan continued to move forward because no force slowed him down when the car was slowed by the brakes.*

11. *The level of water in the ground may vary as a result of how much rain or snow falls, how much of the rainfall or water from melting snow runs off, how much of the water evaporates, and how much water people use.*

3 12. To measure the amount of force needed to pick up a book off a table, you hang it from a force meter. The spring will stretch until the upward force is equal to the downward force.



a. What is the downward force called?

b. How can you tell when the upward and downward forces are unbalanced?

c. How can you tell when the upward and downward forces are balanced?

1 13. Once in space, spacecrafts can travel millions of kilometres on only 1 L of fuel. Explain why fuel economy in space is so good.

2 14. Which of the following does not belong because its function differs from the others? Describe how its function differs from the rest.

- television
- telephone
- clock
- radio
- postcard

1 15. Why do running shoes have treaded soles instead of smooth soles?

PART C: RESPONSE PAGE

12. a. *The downward force is called gravity.*

    b. *The forces are unbalanced as long as there is movement of the spring or pointer on the force meter.*

    c. *The forces are balanced when the spring stops stretching. The pointer is stationary on the scale of the force meter.*

13. *In space, the force of gravity is very weak and there is little or no friction present. As a result, little fuel is needed to keep the spacecraft moving.*

14. *The clock does not belong in this group since a clock's function is to tell time, while the others serve in communication.*

15. *Treads on the soles of running shoes increase the amount of friction so that they grip better than smooth soles.*

3 16. The following terms apply to either mass or weight. Place each of the following terms under the appropriate column in the chart.

- kilogram
- balance scale
- spring scale
- newton
- the same on every planet
- different on every planet

4 17. While on holidays Lucy visited an area that she thought might once have been covered by glaciers. Briefly describe four clues that could have lead Lucy to make this inference.

2 18. Explain each of the following processes and give an example of each process.

a. Mechanical Weathering

b. Biological Weathering

PART C: RESPONSE PAGE

16.

Mass	Weight
• *kilogram*	• *newton*
• *balance sclae*	• *spring scale*
• *the same on every planet*	• *different on every planet*

17. *Answers will vary. Some of the clues she may have observed are*

- *striations – scratches in rock, all in the same direction*
- *shape of valleys – glaciers caused U-shaped valleys*
- *moraines – ridges of rock which were built up along the sides and ends of glaciers*
- *drumlins – long, oval-shaped hills found in areas once covered by glaciers*
- *erratics – large rocks carried by glaciers to a location where rock types are different*
- *kettle lakes – hollows formed in the surface of the land where large blocks of buried ice melted*

18. a. *Mechanical weathering is the process by which rocks are broken into smaller pieces by physical forces such as water and changes in temperature. For example, water may freeze in the cracks of rocks, forcing the sides of the cracks apart.*

b. *Biological weathering is the breaking up of rocks by the action of living things. For example, plant roots growing into tiny cracks in rocks force the cracks to widen.*

2 19. You are given the task of building a bridge over a river. The following are steps in the planning process. List them in the order in which they would occur.

- make a scale model
- consider different designs
- decide on a design
- test the design

3 20. Name three different kinds of thermometers and explain how they work.

2 21. What is significant about the following temperatures?

a. 0°C

b. 37°C

2 22. You are required to boil a pot of water. Describe two different ways you could do this. Use a different type of energy as your source of heat for each method.

PART C: RESPONSE PAGE

19. • *consider different designs*
    • *decide on a design*
    • *make a scale model*
    • *test the design*

20. *Answers will vary. Following are some sample answers.*

    • *liquid thermometers – These may include laboratory thermometers, clinical thermometers, and weather thermometers. These depend on the expansion and contraction of liquids for their operation.*

    • *liquid crystal thermometers – These may include thermometers used to measure body temperature, and mood rings. They depend on changes in the colour of the crystals as temperature changes.*

    • *solid thermometers – These may include spring type weather thermometers, thermostats which use bimetallic strips, and oven thermometers. They depend on the contraction and expansion of metals for their operation.*

    • *thermocouples – These devices use electricity to measure temperature.*

    • *optical pyrometers – These devices analyse the brightness and kinds of light given off by objects to measure temperature.*

21. a. *The freezing point of water is 0°C.*

    b. *Normal body temperature is 37°C.*

22. *Answers will vary. Sample answers follow.*

    • *Chemical energy from a wood or natural gas fire can be used to heat the pot of water.*

    • *Electrical energy by the use of an electric stove or electric kettle can be used to boil the water.*

3 23. State three different methods used to preserve food and explain how each of the methods help to preserve the food.

1 24. Why does bread dough containing yeast rise?

1 25. Why should you not buy canned foods in cans which have been dented?

PART C: RESPONSE PAGE

23. *Answers will vary. Some methods and how they help to preserve the food are*

- *freezing – deprives micro-organisms of warmth*
- *canning – deprives micro-organisms of oxygen*
- *drying – deprives micro-organisms of moisture*
- *freeze-drying – deprives micro-organisms of moisture*
- *chemical additives – prevents or retards the growth of micro-organisms*
- *irradiation – kills the micro-organisms in the food*

24. *When bread dough is left in a warm place the yeast cells grow and multiply, producing bubbles of carbon dioxide which causes the dough to rise.*

25. *Dented cans could have small holes in them through which air and micro-organisms could enter.*

END OF FINAL TEST

TEACHER'S COPY

SCIENCE 7

FINAL TEST

GENERAL INSTRUCTIONS

YOU HAVE TWO HOURS TO COMPLETE THIS TEST. Work through the entire test answering the questions you are sure you know. You will then be able to concentrate on the questions of which you are not quite sure.

TOTAL MARKS: 100

PART A: Multiple Choice – 35 marks
PART B: True or False – 15 marks
PART C: Short Answer – 50 marks

PART A: MULTIPLE-CHOICE QUESTIONS

Value Part A is worth 35 percent of the total examination mark.

All multiple-choice questions must be answered on the Part A: Response Page included in your test.

Read each question carefully and decide which of the choices BEST completes the statement or answers the question. Locate the question number on the Response Page and place the appropriate letter in the space provided.

1 each

1. The word that best describes a push or pull that causes an object to move, or stop, or change its speed or direction is

   A. resistance
   B. force
   C. friction
   D. inertia

2. When a large river carrying sediments enters a standing body of water, the feature that may eventually form is a(n)

   A. tributary
   B. floodplain
   C. oxbow
   D. delta

3. Hoodoos, or caps of hard rock on top of columns of softer rock, are probably formed by the action of

   A. water and wind erosion
   B. valley glaciers
   C. earthquakes
   D. volcanoes

4. A cactus has shrunken leaves that look like spines. These needle-like leaves prevent water loss. This is an example of a(n)

   A. behaviour adaptation
   B. involuntary response
   C. structural adaptation
   D. voluntary response

5. An astronaut on the moon is about to drop a piece of notepaper and a book. She says the book will hit the ground first. She has made a(n)

   A. hypothesis
   B. observation
   C. conclusion
   D. theory

6. At room temperature a metal ball will just fit through a metal ring. If the ball was cooled under cold water, which of the following would you observe?

   A. The ball would not be able to pass through the ring.
   B. The ring would decrease in size.
   C. The ball would pass through the ring more easily.
   D. The ball would increase in size.

7. Different kinds of balls are pushed to the bottom of a bathtub. Predict which ball will **not** float to the surface.

   A. styrofoam ball
   B. steel ball
   C. ping-pong ball
   D. tennis ball

8. If 200 mL of water at 20°C were added to 100 mL of water at 80°C, the final temperature of the mixture would be

   A. closer to 20°C than to 80°C
   B. closer to 80°C than to 20°C
   C. half way between 20°C and 80°C
   D. close to 100°C

9. In doing a scientific investigation which of the following processes would you do first?

   A. Control the variables.
   B. State a conclusion.
   C. Select the materials needed.
   D. Make a hypothesis.

10. A tied inflated balloon increases in size with an increase in temperature because

A. more air molecules enter the balloon
B. the air molecules in the balloon increase in size
C. the air molecules in the balloon move further apart
D. the air molecules decrease in size as the spaces between them become larger

11. To calibrate a thermometer means to

A. shake a clinical thermometer before using it
B. make a scale of numbers or units on the thermometer
C. check the accuracy of the thermometer
D. heat and cool the thermometer to see if it is working properly

12. A solid differs from a liquid in that the molecules of a solid

A. move more slowly and are further apart than those of a liquid
B. move more quickly and are closer together than those of a liquid
C. move more slowly and are closer together than those of a liquid
D. move more quickly and are further apart than those of a liquid

13. Deposition is a process in which rock particles

A. settle down after being carried by wind or water
B. are broken into smaller pieces
C. are changed chemically by natural substances in the rock
D. are worn away and moved from place to place

14. An example of a slow change is

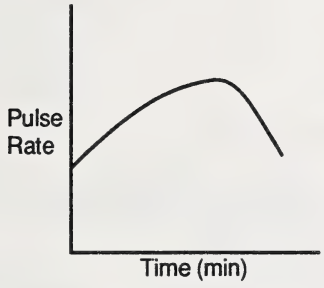
A. the formation of a gully as a result of runoff during a heavy rainfall
B. canyon formation
C. an avalanche
D. a landslide

15. Small differences in size, shape, colour, or behaviour among individuals of a species are known as

A. adaptations
B. characteristics
C. responses
D. variations

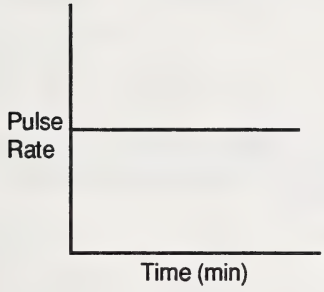
16. Which of the following graphs would best show the relationship between your pulse rate and the time exercised if you exercised for 5 minutes, then rested for 5 minutes?

A.

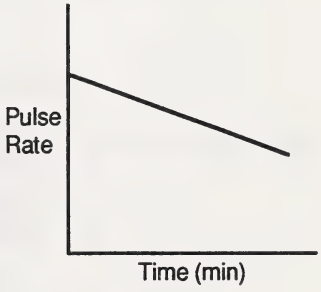


C.

B.



D.



17. The correct order of the stages of a housefly's life cycle is

A. adult, egg, pupa, larva
B. larva, adult, egg, pupa
C. pupa, adult, larva, egg
D. egg, larva, pupa, adult

18. A response to a stimulus is shown by

A. a hand being pulled back quickly upon touching a hot object
B. a moth flying towards light
C. a plant growing towards a light source
D. all of the above

19. Your socks stick together when coming out of the dryer. You are observing

A. magnetism
B. electrostatic forces
C. gravity
D. buoyancy

20. A 100 g object exerts a force of

A. 1 N
B. 10 J
C. 100 N
D. 100 J

21. The slower the water in a stream flows, the

A. greater the number of large particles it will carry
B. greater the number of smaller particles it will carry
C. fewer the total number of particles it will carry
D. fewer the number of large particles that it will deposit

22. A honeycomb of a beehive and a brick wall show similarity in design by being

A. held together by a similar type of substance
B. made of a single shape that is repeated over and over
C. made of the same materials
D. built in a similar fashion

23. The major reason for making a scale model of a bridge would be to

A. test the design of the bridge for strength
B. test the materials to be used in the actual construction
C. estimate the costs of construction of the bridge
D. see if the bridge is visually attractive

24. The rules or written instructions that define the requirements for a plan or structure are

A. prototypes
B. trusses
C. specifications
D. alloy

25. During a time known as the "Dirty Thirties," erosion problems resulted mainly due to

A. very hot summers with frequent hail storms
B. swarms of grasshoppers and lack of rain
C. wind and lack of moisture
D. flooding

26. Moulds are a type of fungus. Some moulds break down wastes and dead materials and return the nutrients to the soil. The micro-organisms described here are classified as

A. decomposers
B. consumers
C. producers
D. composers

27. Many people consider food preserved in a natural form to be more appetizing. Which point of view is represented by the statement?

A. aesthetic
B. economic
C. environmental
D. scientific

28. A family needs a license to open a new restaurant in a small town. The level of government which is responsible for issuing such a license is

A. federal
B. provincial
C. municipal
D. town office

29. The two groups of micro-organisms which are responsible for most of the health problems caused by micro-organisms are

A. protozoa and algae
B. bacteria and fungi
C. viruses and bacteria
D. algae and viruses

30. A carton of milk is left out for several hours on a warm sunny day. Which of the following statements is true?

A. The milk will be safe to drink because the carton protects the milk from micro-organisms landing on it.
B. The milk may not be safe to drink because the heat from the sun causes micro-organisms to multiply.
C. The milk will be safe to drink because all the conditions which are required in order for micro-organisms to grow were not met.
D. The milk will be safe to drink because it takes days, not hours, for food to spoil.

31. Which of the following is not a fermented food?

A. chocolate
B. yogurt
C. grapes
D. cheese

32. The type of food poisoning caused when micro-organisms are not properly destroyed before being sealed in jars during the canning process is

A. botulism
B. gastroenteritis
C. salmonellosis
D. staphyloccal food intoxication

33. The smallest kind of micro-organisms, considered by some scientists to be non-living are

A. bacteria
B. algae
C. viruses
D. protozoa

34. The energy content of foods and fuels can be measured in units called

A. grams
B. joules
C. newtons
D. litres

35. You want to find out which is easier to pull – a wooden toboggan or an aluminum toboggan of the same design. Which variable is being manipulated in this situation?

A. design of the toboggans
B. force of the pull
C. temperature of the snow
D. materials used in the construction of the toboggans

PART A: RESPONSE PAGE

_____	1.	_____	19.
_____	2.	_____	20.
_____	3.	_____	21.
_____	4.	_____	22.
_____	5.	_____	23.
_____	6.	_____	24.
_____	7.	_____	25.
_____	8.	_____	26.
_____	9.	_____	27.
_____	10.	_____	28.
_____	11.	_____	29.
_____	12.	_____	30.
_____	13.	_____	31.
_____	14.	_____	32.
_____	15.	_____	33.
_____	16.	_____	34.
_____	17.	_____	35.
_____	18.		

Name of Student _____ Student I.D. # _____

Name of School _____ Date _____

PART B: TRUE OR FALSE

Value Part B is worth 15 percent of the total examination mark.

Indicate whether the statements are true or false with capital letters **T** or **F** in the short blanks to the left of the numerals on the response page. On the lines to the right of the appropriate numerals, indicate how the false statements can be changed to make them true.

1 each

1. All micro-organisms are single-celled.
2. Weathering carries away rock fragments from the land.
3. Porosity of soil refers to how much space there is between the particles which make up the soil.
4. The particle theory of matter is useful in explaining the effect of heat on solids, liquids, and gases.
5. A geyser provides evidence of solar energy.
6. When the snout of a glacier moves further down a valley each year, it is said that the glacier is retreating.
7. A bimetallic strip bends when it is heated or cooled.
8. Weight changes according to the force of gravity.
9. The mass of a beam cannot be reduced without reducing its strength.
10. Many of the manufactured structures are actually designed along the lines of structures found in nature.
11. In a suspension bridge, the cables are under compression and the piers are under tension.
12. For every action there is an equal but opposite reaction.
13. It is necessary to use heavy and strong materials for the construction of structures that are to be used in space.
14. When building a bridge across a river, environmental impact should be one of the factors to be considered.
15. Changes in taste, texture, smell, and appearance are indications that micro-organisms have been used in a food production process.

PART B: RESPONSE PAGE

_____ 1. _____

_____ 2. _____

_____ 3. _____

_____ 4. _____

_____ 5. _____

_____ 6. _____

_____ 7. _____

_____ 8. _____

_____ 9. _____

_____ 10. _____

_____ 11. _____

_____ 12. _____

_____ 13. _____

_____ 14. _____

_____ 15. _____

Name of Student _____ Student I.D. # _____

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PART C: SHORT ANSWER

Value Part C is worth 50 percent of the total examination mark.

Answer the following questions. Put your responses in the appropriate spaces on the response pages provided.

Be sure to read and think about each question thoroughly before you respond.

2 1. To survive the Canadian winter some organisms either **hibernate** or **migrate**. Explain what each of these two words mean, and give an example of an organism that hibernates and one that migrates.

2 2. Explain the difference between **instinctive behaviour** and **learned behaviour**. Give an example of each type of behaviour.

2 3. In autumn, leaves fall from trees to the ground. Should these leaves be classified as living or non-living, or should they be placed into another classification category? Explain your answer.

PART C: RESPONSE PAGE

1. _____

2. _____

3. _____

Name of Student _____ Student I.D. # _____

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1 4. What ability do the following organisms have in common that helps them to survive in their environment?

- walking stick insect
- tiger
- zebra

1 5. Why do plants on land have hard and strong stems while the stems on plants found in water are limp and soft?

2 6. Suppose you want to strengthen a screen door. To do this you want to use one piece of wood. On the rectangular door frame shown, draw how you would place the board to give the frame the most strength. Explain why you would place the board where you did.

2 7. When planning how to place a beam that is intended to support a load, should you sit it on its wider or narrower edge? Why?

1 8. Why should hot water not be poured directly into an ordinary drinking glass?

PART C: RESPONSE PAGE

4. _____

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Name of Student _____ Student I.D. # _____

Name of School _____ Date _____

4 9. Suppose you were to design a desk and a chair for your room. List at least four factors you would need to consider in your design.

2 10. Explain the following observations.

a. The magician pulled the tablecloth out from under all the dishes without breaking even one.

b. Nolan was not wearing his seat belt and when his father braked suddenly, Nolan was thrown forward out of his seat.

1 11. Explain why the water table may be at different levels at different times.

PART C: RESPONSE PAGE

9. _____

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10. a. _____

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b. _____

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11. _____

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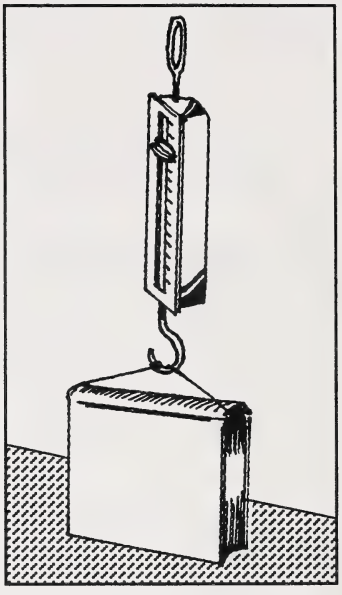
Name of Student _____ Student I.D. # _____

Name of School _____ Date _____

3 12. To measure the amount of force needed to pick up a book off a table, you hang it from a force meter. The spring will stretch until the upward force is equal to the downward force.



a. What is the downward force called?

b. How can you tell when the upward and downward forces are unbalanced?

c. How can you tell when the upward and downward forces are balanced?

1 13. Once in space, spacecrafts can travel millions of kilometres on only 1 L of fuel. Explain why fuel economy in space is so good.

2 14. Which of the following does not belong because its function differs from the others? Describe how its function differs from the rest.

- television
- telephone
- clock
- radio
- postcard

1 15. Why do running shoes have treaded soles instead of smooth soles?

PART C: RESPONSE PAGE

12. a. _____

_____

b. _____

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_____

c. _____

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13. _____

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14. _____

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15. _____

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Name of Student _____ Student I.D. # _____

Name of School _____ Date _____

3 16. The following terms apply to either mass or weight. Place each of the following terms under the appropriate column in the chart.

- kilogram
- balance scale
- spring scale
- newton
- the same on every planet
- different on every planet

4 17. While on holidays Lucy visited an area that she thought might once have been covered by glaciers. Briefly describe four clues that could have lead Lucy to make this inference.

2 18. Explain each of the following processes and give an example of each process.

a. Mechanical Weathering

b. Biological Weathering

PART C: RESPONSE PAGE

16.

Mass	Weight
•	•
•	•
•	•

17. • _____

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• _____

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• _____

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• _____

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18. a. _____

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b. _____

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Name of Student _____ Student I.D. # _____

Name of School _____ Date _____

2 19. You are given the task of building a bridge over a river. The following are steps in the planning process. List them in the order in which they would occur.

- make a scale model
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3 20. Name three different kinds of thermometers and explain how they work.

2 21. What is significant about the following temperatures?

a. 0°C

b. 37°C

2 22. You are required to boil a pot of water. Describe two different ways you could do this. Use a different type of energy as your source of heat for each method.

PART C: RESPONSE PAGE

19. •
•
•
•

20. •
•
•

21. a.

b.

22. •
•

Name of Student _____ Student I.D. # _____

Name of School _____ Date _____

3 23. State three different methods used to preserve food and explain how each of the methods help to preserve the food.

1 24. Why does bread dough containing yeast rise?

1 25. Why should you not buy canned foods in cans which have been dented?

PART C: RESPONSE PAGE

23.

- _____
- _____
- _____

24. _____

25. _____

END OF FINAL TEST

Name of Student _____ Student I.D. # _____

Name of School _____ Date _____

This is a course designed in a new distance-learning format, so we are interested in your responses. Your constructive comments will be greatly appreciated so that a future revision may incorporate any necessary improvements.

TEACHER QUESTIONNAIRE FOR SCIENCE 7

Teacher's Name _____ Teacher's area of expertise _____

School Name _____ Date _____

Design

1. The modules follow a definite systematic design. Did you find it easy to follow?

   ❑ Yes ❑ No If no, explain.

   _____

   _____

2. Did your observations reveal that the students found the design easy to follow?

   ❑ Yes ❑ No If no, explain.

   _____

   _____

3. Did you find the Learning Facilitator's Manuals helpful?

   ❑ Yes ❑ No If no, explain.

   _____

   _____

4. Part of the design involves stating the objectives in student terms. Do you feel this helped the students understand what they were going to learn?

   ❑ Yes ❑ No If no, explain.

   _____

   _____

5. The questions in the Module Booklet are to help clarify and reinforce the instructional materials. The answers were placed in the Learning Facilitator's Manuals. Did this design prove helpful?

❑ Yes ❑ No If no, explain.

_____

_____

6. Did the Follow-Up Activities prove to be helpful?

❑ Yes ❑ No If no, explain.

_____

_____

7. Were students motivated to try these Follow-Up Activities?

❑ Yes ❑ No If no, give details.

_____

_____

8. Companion audio programs are included in the course. Did your students find them helpful?

❑ Yes ❑ No Comment on the lines below.

_____

_____

9. Suggestions for video activities are included in the course. Were your students able to use these activities?

❑ Yes ❑ No Comment on the lines below.

_____

_____

10. Were the assignments clear?

❑ Yes ❑ No If no, give details.

_____

_____

11. Were the assignments appropriate?

❑ Yes ❑ No If no, give details.

_____

_____

12. Did you fax assignments?

❑ Yes ❑ No

13. If you did fax, did you get satisfactory results from using this procedure?

❑ Yes ❑ No If no, give details.

_____

_____

_____

Instruction

1. Did you find the instruction clear?

   ❑ Yes ❑ No If no, give details.

   _____

   _____

2. Did your observations reveal that the students found the instruction interesting?

   ❑ Yes ❑ No If no, give details.

   _____

   _____

3. Did you find the instruction adequate?

   ❑ Yes ❑ No If no, give details.

   _____

   _____

4. Was the reading level appropriate?

   ❑ Yes ❑ No If no, give details.

   _____

   _____

5. Was the work load adequate?

   ❑ Yes ❑ No If no, give details.

   _____

   _____

6. Was the content accurate and current?

❑ Yes ❑ No If no, give details.

_____

_____

7. Did the content flow consistently and logically?

❑ Yes ❑ No If no, give details.

_____

_____

8 Was the transition between booklets smooth?

❑ Yes ❑ No If no, give details.

_____

_____

9. Was the transition between print and media smooth?

❑ Yes ❑ No If no, give details.

_____

_____

Additional Comments

When you have completed this questionnaire, please mail it to the following address.

Design Department
Alberta Distance Learning Centre
Box 4000
Barrhead, Alberta
T0G 2P0

This booklet cannot be purchased separately; the Learning Facilitator's Manual is available only as a complete set.

Science 7

9SC07T16

L.R.D.C. Producer

FIRST EDITION 1991